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THE AMERICAN
JOURNAL OF PHARMACY

NOVEMBER, 1917

EDITORIAL.

The Policy of the American Journal of Pharmacy.

The American Journal of Pharmacy was established by the Philadelphia College of Pharmacy in 1825. This ambitious organization, which had been founded but four years earlier, already realized the need of an American drug journal. The primary purpose to be served by such a publication was the education and professional advancement of those engaged in the calling. It was not only to promulgate the views of the membership of the College and to permanently record its activities but, far more important, it was to disseminate useful information presented in original contributions, researches and essays and in selected published articles so as to extend the knowledge of those engaged in the drug business and the professional services of pharmacists.

It was very fortunate that the initial direction of the American Journal of Pharmacy was under the editorship of Daniel B. Smith. Under the wise guidance of that talented author, versatile scientist and public-spirited pharmacist, this publication was established on a high plane as an ethical journal devoted to the pharmaceutical sciences. The editorial successors of Daniel B. Smith have been Dr. Benjamin Ellis, Dr. Robert Eglesfeld Griffith, Dr. Joseph Carson, Prof. Wm. Procter, Jr., Prof. John M. Maisch, Prof. Henry Trimble and Prof. Henry Kraemer. Each of these held an eminent position in his chosen field of scientific and professional study and each incumbent of the editorial chair has efficiently sustained the prestige of the Journal.

Changes are inevitable, and the resignation of the editorship by Prof. Henry Kraemer, due to his acceptance of a chair in the faculty of the University of Michigan, is regretted by the Com-

mittee on Publication. He carries with him to his new sphere of labor the best wishes of his associates and colaborers in pharmacy and of the management, and of the subscribers of the AMERICAN JOURNAL OF PHARMACY.

Quite naturally, the pages of a journal reflect the personality of the editor and his viewpoint as to the needs of his readers. The incumbent upon whom has fallen, unexpectedly, the editorial management for the time being, shall endeavor to maintain a broad horizon so that this JOURNAL will serve in the widest and best sense the diversified interests of pharmacy, whether they tend to progress along any of the lines that we denominate as educational, legislative, scientific, practical, or commercial.

The pages will be open to correspondents for the proper presentation of any subject pertaining to pharmacy. The importance of many of the questions confronting the nation or affecting the interests of the drug trade justify editorial consideration. Whatever changes may be made in the presentation of subject matter, the readers of the AMERICAN JOURNAL OF PHARMACY are assured that the scientific standing and policy of this, the oldest journalistic advocate of and consistent exponent of the ethical practice of pharmacy through a long and memorable career, will not be changed.

G. M. B.

THE NEWER ANTISEPTICS.

Every great event influences the practices of the world in proportion to its importance; so the world war, as one of the greatest events in the history of the world, is having a prodigious effect on practically every avenue of human activity on the face of the globe. To medicine it is bringing newer and larger problems than have ever before been presented. The solution of these calls forth new theories, extensive study, research and experimentation.

Not the least of the medical problems of the war has been the treatment of the numerous wounds, many of which, from the very character of the warfare, are seriously infected. While the basic teachings of Lister on aseptic surgery are firmly established and are followed, the surgeons have been confronted by an alarming situation calling for improvements on the methods and agents formerly employed.

The surgeons vying with each other in their efforts to determine the best methods and agents to establish and maintain aseptic con-

dition of wounds, have experimented, on the unprecedented scale possible, with numerous new formulas and chemicals. As a result medical practitioners are confused by the conflicting reports and claims set up for many new products, each advocated by a sponsor as possessing superior antiseptic properties and probably each of these, under the conditions applied by the skilled surgeon, has given good results. The law of the survival of the fittest will, doubtless, finally determine which of these will meet with continued favor and extended use.

The duty of the pharmacist is to study all of these formulas and methods of producing asepsis as they appear in the literature and to be prepared to intelligently give information thereon and likewise to properly prepare and supply any of the products. The present number of the AMERICAN JOURNAL OF PHARMACY presents a journalistic symposium on the newer antiseptic treatments. The purpose has been to bring together all of the salient features of the various contributions on this subject that have appeared in the medical and pharmaceutical literature, so that the busy physician and pharmacist will have in a condensed form the authoritative information on the subject.

For other important articles on the Carrel-Dakin Solution the reader is referred to February, 1917, number, page 84, and to the September, 1917, number, page 396, and to a note on the preparation of dichloramin-T in September, 1917, number, page 419, and to the abstracts in the present number. From time to time, additional information will be supplied in these pages.

G. M. B.

PROPER PHARMACEUTICAL SERVICE A MILITARY NECESSITY.

Modern warfare has demonstrated that superiority of brute force alone is not sufficient to determine victory. Ingenuity and the intelligent and energetic application of every resource at the command of the nation are recognized as potent factors in determining to which side will fall the laurel of achievement, the glory of victory. There are many ways of rendering war service to the nation, other than fighting, and everything that tends to the health, comfort and efficiency of the men in arms is a direct benefit to the nation and an aid to early victory and that world peace that we pray will follow this world war.

To conserve the health of the soldiers and to recuperate the sick

and wounded by the utilization of the most scientific and approved method and to thus increase the percentage of human salvage and maintain the army at its maximum efficiency, is now acknowledged by intelligent commanders to be an imperative need of the modern army. Japan and the European continental countries, such as France and Germany, who have maintained efficient armies have recognized the importance of taking advantage of and using to the fullest extent the scientific knowledge of pharmacists and their special training along professional and commercial lines.

Those responsible for the organization and service of the Medical Department of our national military service, cannot continue to ignore the disparity existing between the pharmaceutical service assured to the French soldier and that stintingly granted to his American ally now fighting as his compatriot. A comparison between the highly scientific and important, pharmaceutic, hygienic and chemical services performed by the French military pharmacists and the very limited pharmaceutical service permitted to be exercised in the American army is not at all creditable to the Medical Department of the Army. Obsolete methods of dispensing and the lack of any pharmaceutical organization or control of army medication can only be considered as incongruous and incompatible with the standing and dignity of the United States and with the status of the medical practices in America.

Pharmacists are fully justified in insisting that there shall be organized pharmaceutical corps in the government service, through which the members of this branch of the medical profession can render most efficiently their proper services to the nation. The pharmacists of the United States are not less competent than those of foreign countries nor are they less patriotic, and, if given a chance to develop, the military chemists and pharmacists will, undoubtedly, as in other branches of their professional services, vie with the most advanced of foreign nations.

That the War Department continues to entrust the dispensing of medicines in the army to men who lack the special education and experience required of pharmacists in civil practice is inexplicable. this foolhardy exposure of our soldiers to the grave danger of untimely death from poisoning is as untenable as it is unwarranted and is an inexcusable national blunder. Instances already reported prove this to be a serious menace to life and not an imaginary danger.

The responsibility must be fixed for this failure to mobilize the pharmaceutical asset of the nation and to organize this into a pharmaceutical corps that will give to our soldiery a proper medical dispensing service; a service worth having.

It is in order for the Department to explain to the satisfaction of the citizens of the United States why their kinsmen and loved ones whom they are sacrificing to the cause of the nation are not given the same care, attention and the scientific, hygienic and pharmaceutical service provided for the soldiers in the modern armies of both our allies and enemies.

The necessity for organized pharmaceutical service in the Army was conclusively proven by the Japanese in the Russo-Japan War and in the present gigantic conflict has been demonstrated again by both France and Germany. The lack of such proper and needed service in the American Army can no longer be attributed to ignorance and this nation cannot continue to condone blind jealousy or medical indifference to the functions of pharmacy.

G. M. B.

THE ANTISEPTICS AND THE WAR.

By Louis Gershenfeld, P.D., B.Sc.

The treatment and prevention of infection have been studied for centuries and, even as far back as 1756, a book was published by Smollett in which he discussed this subject. Sterilization and antiseptic methods have undoubtedly been greatly improved since the day of Smollett, but the improvements effected have not yet reached perfection and these remain as serious factors in the present world war.

At the beginning of the present conflict, the medical profession was considerably confused in adjusting itself to definite antiseptic methods. Trench warfare was a new condition, heretofore not faced by any army. Besides the caring for the cleanliness of the trenches, the problems of wound infection became more serious, due to the extreme abundance of all sorts of organisms present in the richly fertilized soil, as well as in the air, which was always laden with dust, due to the continual heavy shell fire. Still a larger factor, perhaps, than the latter, was the occurrence of sepsis, due to the destruction and devitalization of tissue by fragments of the most

deadly, modern missiles. As the war progressed, experience, together with painstaking care, began to mold and develop systematic methods, which appear to give certain and satisfactory results.

It is my intent to present in this paper the important facts concerning the various chemicals and substances, that are to-day playing a big rôle as antiseptics in this war. It would be almost impossible to detail the approved methods of treatment by these substances, as the extended experience and knowledge, from the masses of cases treated, have evolved a system in which the wounds are differentiated and subdivided into groups. These in turn are placed in special wards and treated by men who are especially qualified to handle the particular class of wounds only.

The search for the ideal germicide began when Pasteur's ideas were put into practice by Lister and his collaborators. The latter applied the first principles in the prevention of infection. They cannot, however, be credited with the solving of the bigger problems that this war has brought forth, the mastering and conquering of infections that have already progressed to an alarming extent.

In surgery of the days preceding this war, the greater number of wounds were indeed simple, not infected, and primarily clean. The technique in treatment depended upon the use of soap, water, alcohol, phenol or cresol solutions, iodine, sterile dressings, and the upkeep of the patients' bacterial resistance. But the demands now made upon surgery by modern warfare necessitated a search for agents to treat infection, as the vast majority of the wounds in this war are grossly infected before coming into the hospital.

The newer antiseptics may be roughly divided into two classes: (1) those that depend upon chlorine for their bactericidal properties, (2) those included in the class of dye products, all of which are elaborate chemical compounds.

THE HYPOCHLORITES.—The bleaching and bactericidal properties of the hypochlorites may be traced back to 1788, when Berthollet obtained a disinfectant liquid by treating alkali with chlorine. In 1846, Semmelweiss aborted an epidemic of puerperal fever by the use of hypochlorite of calcium. From time to time, various investigators reported the active antiseptic properties of the different hypochlorite solutions. It has been found, however, that the latter are unstable and too caustic for medicinal as well as surgical use. It then remained for Dakin, Carrel and their associates to correct these reprehensible qualities and adopt them to the big rôle they are playing to-day.

EUPAD — SOLUTION OF EUSOL — AND HYPOCHLOROUS ACID.— While Dakin and Carrel were attempting to prepare a satisfactory hypochlorite antiseptic solution, Prof. J. L. Smith and his associates, of the University of Edinburgh, found that free hypochlorous acid was a more active antiseptic than its salts. Its bactericidal value was high and it also possessed the advantage of not coagulating albuminous matter. To effect a complete liberation of the hypochlorous acid, they first prepared a powder by intimately mixing equal parts of finely ground chlorinated lime and boric acid. This was named eupad.

Solution of eusol was made by mixing 25 Gms. of eupad with one liter of water, allowing the mixture to stand for 3 or 4 hours, then siphoning off the supernatant liquid and filtering the remainder, to rid it of the insoluble calcium borate. The filtrate, solution of eusol, contains some calcium chloride and about .5 per cent. of free hypochlorous acid, which corresponds to about .34 per cent. of available chlorine.

Still later, Drs. Beattie, Lewis, and Gee succeeded in preparing hypochlorous acid electrically from hypertonic saline solution. The apparatus used is ingenious and simple and can readily be fixed up in any hospital or laboratory. For further reference, the reader is referred to their original article in the *British Medical Journal* (Feb. 24, 1917, page 256).

DAKIN-CARREL SOLUTION.—Drs. Dakin and Carrel began their work in Prof. Triffier's laboratory, in Paris, in December, 1914, to overcome the problems that confronted the medical units in this war. They tested hundreds of chemicals before their hypochlorite solution was perfected in June, 1915, which was destined to become one of the most successful antiseptics ever put forth.

The formula, technique and mode of preparation of the solution have been published in the leading scientific journals and it would be useless to rewrite them here. However, I may mention that Dakin's original formula, containing boric acid, has been replaced by Dufrasne's modification, in which boric acid is excluded, and sodium bicarbonate, anhydrous sodium carbonate, chlorinated lime and water are the revised ingredients (this solution being known as Neutral Dakin-Carrel Solution). Though some laboratories market a concentrated hypochlorite solution and advise the dilution and neutralization of the alkalinity with boric acid before use, it is inadvisable to follow such procedure as some have reported rather

lamentable results when solutions containing boric acid have been used, and such action is claimed to be due to the sodium borate formed. The Dufrasne solution has also been found to be more bactericidal and less caustic than the original formula.

In preparing the solution, the two important facts essential to note are that the end product is to be absolutely free of alkali and the solution should not be used if the hypochlorite content is much below .45 per cent. or above .5 per cent. (which corresponds to about .22 per cent. available chlorine). This particular strength can be maintained with little variation for at least a month, a fact which in itself ought to discourage the use of modified formulas for extemporaneous preparation. I have kept a solution, that originally contained .487 per cent. sodium hypochlorite, for over 34 days before its strength registered below .45 per cent. The latter solution was kept in 4-ounce, 8-ounce, 1-pint and ½-gallon amber-colored bottles, both in the light and in a dark place, and the identical solution kept in green glass bottles, and placed in the dark, showed almost similar results.

Besides the two important facts noted, success or failure in treatment depends on the mode of procedure. It can be safely said that those who reported valueless results, when using this solution, employed a preparation that was faulty or they knew too little of how to put it to service in treating wounds; and it is due to its improper use by such individuals, that the idea was at times conveyed that Dakin's solution is a useless panacea. It is not a "cure for all" but very valuable in many cases, when each and every step is exactly and implicitly followed out, as directed by Dr. Carrel.

In the first place, all areas surrounding the wound should be cleaned with ether or benzene. After shaving the area encircling the wound, all dead tissue should be cut away. Be certain that all of the necrotic and devitalized tissue as well as all foreign matters are removed. After further cleansing with soap, the area is painted with iodine. Then with fresh sterile instruments, the wound is opened and exposed, preferably in basin-like cavities. All bleeding parts are carefully and cautiously controlled. Special care is to be noted that all blood clots are removed, as the hypochlorite solution dissolves blood clots, and subsequently severe secondary hemorrhage may set in. The final treatment before applying the solution is to place bandages, enmeshed with petrolatum along the edge of the wound so as to avoid irritation of the surrounding skin tissue.

In using the solution, after all preliminary work has been completed, care must be taken to obtain an even and not too strong flow of the fluid and also that the fluid flows away freely. If applied as a dressing, it must be changed frequently as its germicidal action, in contact with living tissue, lasts for about one hour only.

The mode of action of the hypochlorites has recently stirred up much discussion, with the outcome that few are supporting, at present, the theory that their antiseptic action is due to the oxygen formed by their decomposition. It appears that in the presence of organic matter, such as living tissue, bacterial products, etc., the hypochlorites liberate chlorine rather than oxygen. A portion of this *Cl* unites with *NH* groups of the proteins, converting them into *NCl* groups, products belonging to the chloramines. The latter possess the antiseptic properties and exert the bactericidal effect. In addition the chloramines formed seem to effect a rapid flow of lymph from the surface of the wound and thus inhibit toxic absorption.

CHLORAMIN-T.—Chloramin-T is a name proposed by Dr. Dakin and those associated with him for the synthetic germicide Toluneparasulphondichloramin. It is non-irritating, non-toxic, considerably more stable than the Dakin-Carrel solution and corresponds to the chloramins described previously as forming between the chlorine of the hypochlorites and the proteins of the tissue. It asserts its antiseptic action as do the hypochlorites and accordingly before application, similar preliminary precautions as are to be heeded before applying the Dakin-Carrel solution, are to be enforced here.

Chloramin-T is soluble in water and thus a more concentrated solution than the Dakin-Carrel fluid can be made. However, in aqueous solutions, its antiseptic properties in the presence of living tissue seem to disappear in about two hours. To overcome this objection and to prolong its antiseptic action in a concentrated solution, so that this powerful germicide which contains about 25 per cent. available chlorine would be thus permitted to diffuse slowly and be more effective, from 5 per cent. to 10 per cent. solutions of chloramin-T in oil were made. The oil used is either chlorinated eucalyptol or equal parts of this and chlorinated paraffin oil. However, most of the units and medical practitioners prefer the use of chlorinated eucalyptol, solely, as the vehicle, and concentrations as high as 20 per cent. are used in some instances.

A solution of this chemical in chlorinated eucalyptol can be

kept for about a month before any noticeable loss is apparent, while with chlorinated paraffin oil as part of the formula, the permanence of the antiseptic is considerably shortened. The only reason for using the paraffin oil is to cheapen the cost of the end product.

Application of this germicide is made by spraying the wound with the oily solution and applying as a covering a few strips of gauze. The slow but persistent action of the oily antiseptic preparation necessitates a change of dressing only once a day, a property which will perhaps hasten the increase of its use as compared with Dakin's fluid.

Chloramin-T, chlorinated eucalyptol, and all of the other Dakin preparations are now manufactured and marketed in this country. The following formulas for preparing Chloramin-T, Chlorinated Eucalyptol, and Chlorinated Paraffin Oil were given by Dr. R. G. LeConte in an article read by him before the American Surgical Association, at Boston, June 2, 1917.

For the Preparation of Toluene-Parasulphondichloramin or Dichloramin-T (Chattaway's method).

Take—

Chlorinated Lime (good quality)	350 to 400 Gm.
Water	2 Liters
Chloroform, Acetic Acid	about 100 mils of each
Toluene-parasulphonamid	75 Gm.

Add the chlorinated lime to the water and shake for half an hour and allow the mixture to settle. Siphon off the supernatant liquid and filter the remainder. Dissolve the powdered toluene-parasulphonamid in the filtrate and filter if necessary. Place this mixture in a separatory funnel and gradually acidify with acetic acid. Add 100 mils of chloroform and extract the dichloramin. Remove the chloroform layer and allow the solution to evaporate spontaneously. Dry the residue in vacuo and powder.

For the Preparation of Chlorinated Eucalyptol.

Take—

Eucalyptol, U. S. P.	500 mils
Potassium Chlorate	15 Gm.
Hydrochloric Acid, U. S. P.	50 mils

Mix all three and allow them to interact for about 12 hours. Wash well with water either by decantation or in a separatory

funnel. Then wash with sodium carbonate solution. Add anhydrous sodium carbonate and allow this to remain there for 24 hours. Filter and dry over calcium chloride.

For the Preparation of Chlorinated Paraffin Oil.

Take—

Paraffin Oil	500 mils
Potassium Chlorate	15 Gm.
Hydrochloric Acid	50 mils

Expose the mixture to the light and then allow it to stand over night. Wash it in a separatory funnel successively with water, salt solution, and finally with water. Add a few pieces of calcium chloride and 5 Gm. of purified charcoal and filter with suction.

Doctors Dufrasne, Vincent and others, at present at the Allies' front, have been using a chloramin-T paste, both for maintaining asepsis of a wound and for sterilizing infected parts. The paste, which appears as a snow-white cream, is sufficiently active to be used effectively but begins to loose its activity in about a month after preparation.

The following is a formula of the paste used by Dr. Dufrasne and published in the July issue of the *Journal of Experimental Medicine.*

Chloramin-T Paste.

Chloramin-T	5 to 20 Gm.	(or the desired quantity)
Stearic Acid	80 Gm.	} or 86 Gm. Sodium Stearate
Sodium Hydroxide	q.s.	
Water	1 Liter	

To one liter of boiled water, add the stearic acid. When the latter has melted, add enough caustic soda to saponify all of the fatty acid. After complete solution, add the chloramin-T to give a product of the desired strength. Shake and finally stir the mixture until it has congealed.

CHLORAZENE.—Another Dakin product is similar to dichloramin-T, being the sodium salt of para-toluenesulphochloramin. In some of the hospitals, the two antiseptics have been used in conjunction, first spraying and thoroughly cleansing the wound with an aqueous solution of chlorazene and then applying the oily solution or paste of dichloramin.

HALAZONE.—Another problem which the war brought forth was

the sterilization of the water supplies in the field. Dr. Dakin, in coöperation with Major E. K. Dunham, U. S. Army Medical Service, announced recently a new chlorine derivative for the sterilization and purification of polluted, contaminated or suspicious water.

This synthetic, chemically known as para-sulphondichloraminbenzoic acid, is the most stable of the recently discovered chlorine preparations and derivatives. It is marketed in tablet form under the name of halazone. Each tablet contains one sixteenth of a grain of the chemical and is sufficient to disinfect and render potable one quart of the most polluted sample of water in from five to thirty minutes, without leaving the resultant sterilized product unpleasant to the taste.

If one attempt an actual study of the working conditions in the medical units, there will be revealed a real lack of systematic and organized method of continuity in treatment. Such a state of affairs has been brought to notice by many of the profession, who are at present in this country for other service or for recuperation. A patient at the company hospital may receive a Wright salt pack or a Bipp dressing—at the field hospital, eusol, hypochlorous acid or dichloramin-T may be used in the treatment. Should he be transferred to the base hospital, he will be treated with Dakin-Carrel solution, while on the inland, flavine, brilliant green or green spray may perhaps be used to effect antisepsis.

It is due to this lack of coöperation and also perhaps to the effects of personal opinion and attempts to discover specific antiseptics that we are compelled to familiarize ourselves with all of these products now in use, until the future will decide the recognition of the best antiseptics and methods of treatment.

Flavine and Similar Dyes.—Although the foregoing antiseptics of the chlorine series have been only recently discovered, they are nevertheless already extensively used in this country. This is, however, not the case with the antiseptics of the flavine group. The latter are not readily obtainable in this country and as yet are only manufactured by two or three firms in England. This is due to the fact that the compounds are elaborate synthetics and much experimentation was necessary before a product equal to that supplied by the German manufacturing plants could be marketed.

The members of the flavine series were investigated in the latter part of the year 1916 by a number of workers in the Middlesex Hospital in England (their original work was published in the

British Medical Journal, Jan. 20, 1917). Since then numerous other observations have been made with the flavine compounds and the investigations have proven most valuable. For technical reasons, the substance first experimented with under the name of "Flavine," has been termed "Acriflavine." This was to avoid confusion with an existing commercial vegetable dye "Flavine," and the German registered and trade marked product "Trypaflavine," an antiseptic originally made for and used by Dr. Ehrlich. Quite recently, a new member has been added to the series under the name of "Proflavine." The latter is at present being manufactured in England on a large scale, as it is easier to produce than "Acriflavine," and likewise more active.

Chemically the flavines are members of the acridine group, the first product being the chloride of diamino methyl acridinum. They are stable, non-toxic, non-irritating and water soluble, being used as a dressing in dilutions of 1:1000 or 1:2000, depending upon the treatment, while in few instances the dry product itself has been employed. Clinical experiences have shown that this series of antiseptics exert a slowly progressive bactericidal action, and that these compounds are enhanced in their potency by the presence of serum almost to tenfold, a feature which promises to bring them into more extensive usage, for it is a known fact that the antiseptic and bactericidal properties of substances commonly used are diminished when in contact with serum. In addition, the flavines are also less harmful to the tissues and do not interfere with the natural defensive mechanism. This latter property enables the effective usage of higher concentrations than ordinarily are employed with other substances.

BRILLIANT GREEN—MALACHITE GREEN.—Two other dye products which have been extensively exploited and used in this war are brilliant green and malachite green.

Brilliant green has been employed in a 1:1000 dilution, either with water or physiological salt solution. The latter solution has been used both as a lotion or, when soaked up in gauze, as a dressing in practically all kinds of wounds and on all kinds of tissue. Although differing from flavine, by loosing part of its bactericidal properties in serum, it is nevertheless potent, non-irritating and devoid of general toxic action. Some have used it as a flush in conjunction with Wright's salt pack treatment or with the Dakin-Carrel method, claiming that the results are better than the use of

either alone. It has also been used effectively as an irrigation in burns before the application of the paraffin treatment.

Malachite green, in conjunction with bichloride of mercury, has been recently used in "Green Spray." This is made of equal parts of 2 per cent. malachite green, dissolved in 80 per cent. ethyl alcohol and 2 per cent. bichloride of mercury, dissolved in 80 per cent. ethyl alcohol. The solutions are mixed before use, and form a chemical compound, known as "Micklethwait." The latter, when in contact with the tissues, is dissociated, forming probably an albuminate of each. The malachite albuminate is readily reduced when in contact with living tissue and is thus capable of exerting its antiseptic action, while the albuminate of mercury is only gradually absorbed, exerting its action rather slowly.

The "Green Spray" has also been extensively used, with success, as an antiseptic spray or dressing before operations, replacing iodine. When used, it stains the applied area green.

In addition to the antiseptics described here, as being the ones most widely used before and after infection has set in, we must not forget the fact that the antiseptics and methods of treatment, in use before the war, are still in use and practiced to-day by many at the front. Many of the minor infections are treated with normal salt solution or hypertonic saline instead of Dakin-Carrel or other solutions. Wright's method of introducing and packing the wound with saline tablets is still used by others. However, it may be emphasized that such treatment has not proven efficacious in the many severe wounds contracted in the war.

Many of the regimental hospitals introduce various mixtures into fresh wounds, so as to allow them to diffuse and inhibit bacterial growth, until thorough disinfection can be applied later. One of these combinations is a powder, called "Borral," which is a mixture of boric and salicylic acids. Another is a cresol paste, made by incorporating 20 per cent. of cresol in a mixture of lanolin and wax. Others use the "Bipp Paste," this sometimes being the sole treatment. The latter consists of one part by weight of bismuth subnitrate, two parts by weight of iodoform and sufficient wax to make a thick paste.

Besides these, the widely used peroxide of hydrogen, tincture of iodine, bichloride of mercury, and others are still extensively used under certain conditions, while the coal tar derivatives, such as the cresols and phenols, are most widely employed in assisting as deodorants and bactericides, in the disposal of excreta in the trenches.

THE DAKIN OR CARREL-DAKIN SOLUTION.

By Ivor Griffith, P.D.

Sodium hypochlorite, which is the chemical to which the antiseptic irrigating solution, known as the Dakin or Carrel-Dakin solution, owes its activity, was discovered by Berthollet, at the end of the eighteenth century. Labarraque, another French chemist, won considerable renown, when he successfully used a solution of this chemical to embalm and deodorize the body of Louis the XVIII, after it had been allowed to partially decay. The solution which he used and which afterwards bore his name is still used for a variety of technical purposes, chiefly as a bleach and disinfectant. At the commencement of hostilities in Europe, scientists and surgeons turned to it and other chlorine compounds with the hope of finding among them the "philosopher's stone" of modern surgery, or in other words, the perfect germicide, search for which has been carried on ever since the dawn of the new era which Lister and Pasteur inaugurated. Dr. LeConte very simply defines this "perfect surgical germicide," in this sentence. "It must kill all parasitic life while causing no harm to any cell of the living body."

The proposition of finding such a germicide presented itself in a most convincing manner to the surgeons of Europe when the endless array of mutilated and mangled soldiers poured into the field and base hospitals of northern France, with virulently infected wounds of such a character that demanded treatment distinctly different from that resorted to in civil surgery. Experimentation with Labarraque's and similar chlorine combinations soon established the fact that such compounds could not be safely used in surgery. They proved to be destructive to the tissue by reason of their high alkali content and irritating on account of their high chlorine content.

Continued study and experimentation, however, resulted in the introduction of what is now referred to as Dakin's original solution. H. D. Dakin, a chemist on the staff of the Herter laboratory, New York, who was in France with the Rockefeller research institute, developed a solution which with a little modification has partially solved the problem of prevention and control of bacterial infection in surgical practice. Dr. Alexis Carrel, also of the Rockefeller Institute, evolved a method of continuous irrigation of wounds by means of Dakin solution, which has proven to be of tremendous significance. The original Dakin solution involved the use of boric

acid in its preparation. This preparation was found objectionable however, due to its irritating qualities which were later attributed to the boric acid. It was Daufresne, a French scientist, who suggested the modification whereby the boric acid was advantageously replaced by sodium bicarbonate. It is the Daufresne modification of the original Dakin formula that is used now in the preparation of Dakin or Carrel-Dakin solution.

While much has been printed in the various journals concerning the history, preparation and standardization of this solution, it is to be regretted that, in several instances, the matter has been presented in a complicated form, much important data being left to the imagination of the reader and in other instances errors seem to have crept into the text. It is, therefore, with the intention of simplifying the text and explaining certain obscure points that this article is presented. It is an attempt to outline the proposition in straight lines instead of hyperbolas.

The Carrel-Dakin solution is essentially a solution of sodium hypochlorite which must be free from caustic alkali. It must contain between 0.45 per cent. and 0.50 per cent. of sodium hypochlorite (not available chlorine as stated in some of the published papers on the subject, and upon which the assay process of the U. S. P. IX for Liquor Sodæ Chlorinatæ is based).

Another error noticed is the assumption that the chlorinated lime on the market contains 25 per cent. chlorine, while as a matter of fact the Pharmacopœia specifies that chlorinated lime shall contain "not less than 30 per cent. of available chlorine." In the writer's judgment it would seem more logical to write the general formula assuming that the lime is nearer to 30 per cent. strength than to 25 per cent. A grocery store sample recently examined showed over 35 per cent.

Reverting to the content of hypochlorite in this solution it might be well to state here that under 0.45 per cent. the solution is not active enough and above 0.50 per cent. it is irritant.

Using chlorinated lime of 30 per cent. chlorine content the following formula is used to prepare ten liters of solution,—

Chlorinated lime	154 Gm.
*Sodium carbonate dried	77 Gm.
Sodium bicarbonate	64 Gm.

*If the monohydrated sodium carbonate is used take 90.5 Gm. or if the crystal sodium carbonate is used take 200 Gm.

Pour into a 12-liter bottle the chlorinated lime and five liters of water, shake vigorously for a few minutes and allow the mixture to stand for twelve hours, shaking at frequent intervals. Dissolve the sodium salts in five liters of water and after the maceration of the chlorinated lime is completed pour the solution of the sodium salts into the other mixture and mix thoroughly. Allow the mixture to stand for at least a half hour until the reaction is complete and the calcium carbonate has subsided. Siphon off the supernatant liquid and filter through white filter paper. The solution is then ready for use.

TITRATION OF THE CHLORINATED LIME.—Because of the variation of this product as now obtained on the market, it is necessary to determine the amount of active chlorine contained in the chlorinated lime which is to be used. This is done in order to use an exact calculated quantity according to its concentration. The assay is carried on in the following manner:

Take from different parts of the container a small quantity of the chlorinated lime so as to have exactly 20 Gm. of a representative sample; mix it as thoroughly as possible in a liter of water and allow the mixture to stand for a few hours.

Measure 10 mils of the clear supernatant liquid and add 20 mils of a 10 per cent. solution of potassium iodide and 2 mils of acetic or hydrochloric acid, then carefully titrate with $\frac{N}{10}$ sodium thiosulphate solution, decoloration of course denoting the end reaction. The number of mils of the $\frac{N}{10}$ sodium thiosulphate solution used multiplied by 1.775 will give the weight of active or available chlorine contained in 100 Gm. of the chlorinated lime; in other words the percentage of chlorine.

This assay must be made every time the solution is being prepared. When the result obtained differs from 30 per cent., it will be necessary to increase or reduce the proportion of the three ingredients in the formula. This can be easily done by multiplying each of the three numbers 154, 77 and 64 by the factor 30/X in which X is the per cent. of active chlorine in the chlorinated lime used.

ASSAY OF THE FINISHED SOLUTION.—It is the correct policy to assay the finished product as well and this is done in the following way:

To ten mils of the finished solution add 20 mils of 10 per cent. solution of potassium iodide and 2 mils of acetic or hydrochloric acid. Titrate with $\frac{N}{10}$ sodium thiosulphate solution until decolora-

tion is complete. The number of mils used multiplied by 0.03725 will be the weight of sodium hypochlorite in 100 mils of the solution; in other words the percentage, weight in volume, of sodium hypochlorite.

To determine absence of free caustic alkali in the finished solution sprinkle on the surface of 20 mils of the solution about 0.2 Gm. of phenolphthalein. No red coloration should appear.

In the preparation of the solution only the highest grade of chemicals should be used. It is a matter of record that nearly all of the unfavorable reports concerning the value of this method of wound sterilization were undoubtedly due to the use of impure chemicals or else negligence in the preparation of the solution. It has been the writer's experience that it more than pays to use the purest procurable ingredients in the manufacture of this exceedingly useful addition to the surgeon's armamentaria.

Concerning the stability or permanence of this solution it has been proven that when kept in a cool, dark place it deteriorates very slowly. A solution, assaying 0.49 per cent. sodium hypochlorite on the day of its preparation, at the end of three months' storage in a well-stoppered bottle kept in a cool, dark place, showed a content of 0.47 per cent. sodium hypochlorite. The same solution, kept two months longer under the same conditions, assayed slightly less than 0.44 per cent., or one degree under its specified strength.

Despite this fact it is always policy to dispense only a recently prepared solution and this is customary in the larger institutions, where the preparation and standardization of this solution has become part of the day's routine work.

AN IMPROVED APPARATUS FOR APPLYING CARREL-DAKIN SOLUTION OR HYPERTONIC SALT SOLUTION ACCORDING TO THE METHOD OF WRIGHT, TANNER AND MATSON.[1]

By Paul S. Pittenger, Phar.D.

In order to make proper use of the Carrel-Dakin solution or hypertonic salt solution for the disinfection of wounds, it is necessary to have a suitable form of apparatus for holding the solution

[1] The *Lancet*, November 11, 1916.

and conveying it in desired quantities at the proper temperature to the wounds requiring treatment.

Several forms of apparatus have been devised for this purpose, but to the minds of many they do not fulfill the requirements demanded in successfully carrying out the above methods of wound sterilization. I have, therefore, devised an apparatus which, although simple in its construction, overcomes the objections that have been raised to various appliances now obtainable.

The apparatus is described in detail further on in this paper, but at this stage I wish to call attention to the following advantages which it possesses over other forms on the market.

SOME ADVANTAGES OF THE IMPROVED APPARATUS.—A caloris bottle is used as the reservoir for the solutions, and thus the temperature at which they are supplied to the instillation tubes may be controlled, thus making it possible to use the apparatus for administering Dakin's solution or for irrigating wounds with saline solution at a constant temperature. It also makes it possible to use the

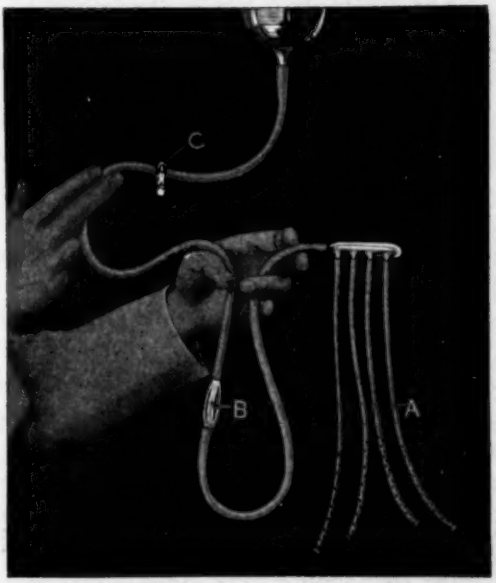

FIG. 1. Instillation apparatus supplied with but *one* sight feed and *one* clamp. This style apparatus is unsatisfactory because it does not distribute the solution uniformly to the instillation tubes. *A*, rubber instillation tubes with ends tied, attached to four-way glass distributing tube; *B*, glass sight feed; *C*, adjustable clamp for controlling flow.

apparatus for hypodermoclysis or Murphy drip when not needed for wound sterilization. The collapsible stand from which the caloris bottle is suspended can be quickly attached to a bed-post of any size. The rate of flow of the solution to each instillation tube is under absolute control, being regulated from the distributing tube to the instillation tubes by means of *individual* clamps which are attached to *each* tube.

By means of the glass sight-feeds the attendant or *patient* can see at a glance whether the solution is being delivered properly to each tube. The instillation tubes employed have rounded ends so that they may be passed into deeply penetrating or "through-and-through" wounds without great pain to the patient. Several wounds can be treated from this apparatus at one time because of the superior method of distribution. No support for the apparatus is needed at the site of instillation, thus saving the patient much discomfort.

DISADVANTAGES IN THE USE OF SOME FORMS OF APPARATUS NOW ON THE MARKET.[2]—Before devising this apparatus no appliance could be found on the market by which it was possible to supply uniformly the solution to two or more different parts of the body from one container. Nor was there any satisfactory mechanical device available for attaching the container of the solution to bed-posts of any size without building a framework of some kind or a support at the site of injection. Furthermore, none of the appliances on the market offered a satisfactory method of controlling the flow of solution so as to insure uniform distribution to each instillation tube.

The two principal forms of apparatus found in use were those illustrated in Figs. 1 and 3. The apparatus shown in Fig. 1 is supplied with but one sight-feed and one clamp and is very unreliable because it does not permit uniform distribution of the solution to the instillation tubes. In other words, when the solution is dropping in the sight-feed at the usual rate, practically all of the solution is carried by the first instillation tube and very little ever reaches the other three tubes. It is therefore necessary to flush the apparatus at intervals in order that some of the solution may be carried by all four tubes, and even then it is impossible to obtain an even distribu-

[2] "Simplification of the Carrel-Dakin Method of Wound Sterilization in Military and Civil Practice," by Albee & Pittenger, *American Medicine*, May, 1917.

tion. Experiments show that when the clamp is opened all the way and the solution is running full force, the third and fourth instillation tubes receive very little if any of the liquid, as practically the entire flow from the distributing tube is carried by the first and second tubes. (See Fig. 2.)

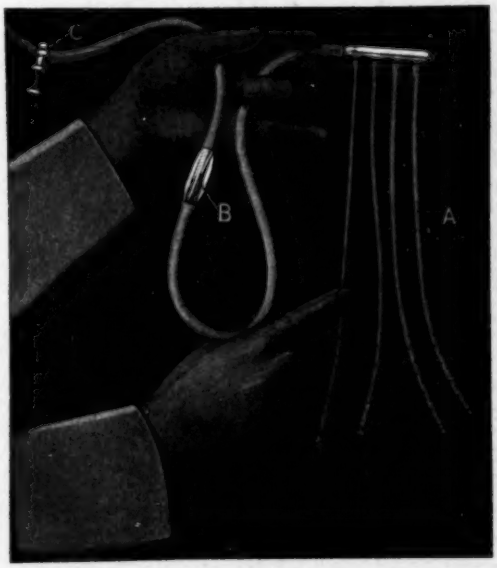

FIG. 2. Shows *uneven distribution* of solution by this style apparatus. Practically all of solution is carried by first instillation tube, very little by the second and only an occasional drop by the third and fourth.

While this form of apparatus would be satisfactory for instilling large shrapnel wounds, it offers the further objection that its short instillation tubes attached to the four parallel outlets of the distributing tube must all be directed to the same site of irrigation and cannot be inserted into the wound from different sides and at different angles.

Some operators have gone so far as to employ with this apparatus a glass distributing tube having as many as eight outlets connecting with eight instillation tubes, even though experiments prove conclusively that practically all of the solution would be carried by the first two tubes unless it is supplied at so great a rate as to cause flooding of the bed. It is the purpose of the Carrel method of wound disinfection to supply only enough solution to keep the inner dressings moist.

In the Rose irrigator shown in Fig. 3, a piece of gauze bandage is inserted into each of the four connecting tubes and the ends of the gauze extend into the large glass sight-feed above. The solu-

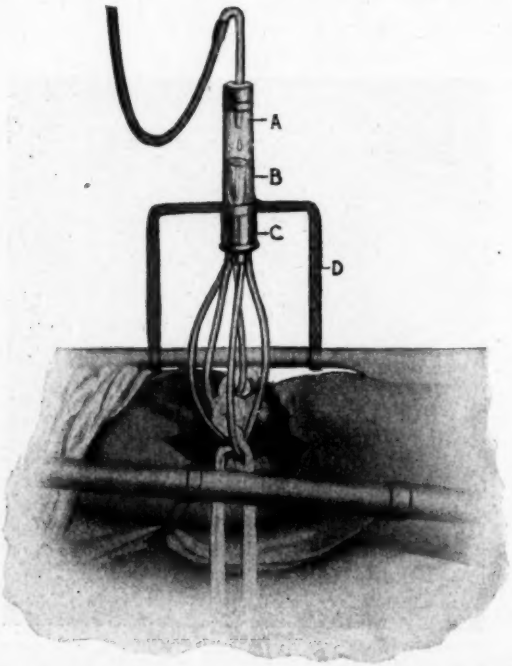

FIG. 3. Rose-irrigator. *A*, drop counter; *B*, gauze filter; *C*, perforated rubber stopper. Pieces of gauze bandage extend from *B*, through the perforations in *C* and into each of the instillation tubes. The solution drops on the upper ends of the bandage in *B* and is carried by capillarity into the instillation tubes.

tion falls on the gauze from the dropper A and is carried into the four instillation tubes by capillarity. There is no way of determining, however, whether or not the four tubes are carrying the solution as desired as the tubes are made of rubber. In case it is desired that only one or two instillation tubes from this apparatus or the one shown in Fig. 2 are to be used, it is necessary to clamp the remaining tubes at the wound thus causing more or less interference when dressing the wound, whereas in the improved apparatus the supply of solution for each instillation tube is independent of all others, and the clamping is done at the upper end of the apparatus.

There will therefore never be more instillation tubes at the site of the wound than are required for irrigation. Another objection to the Rose irrigator is found in the fact that the glass reservoir from which the solution is distributed to the various instillation tubes must be held in a vertical position by some form of support at the site of the wound. If, for example, a patient should happen to have two wounds in the same leg, one above the knee and the other

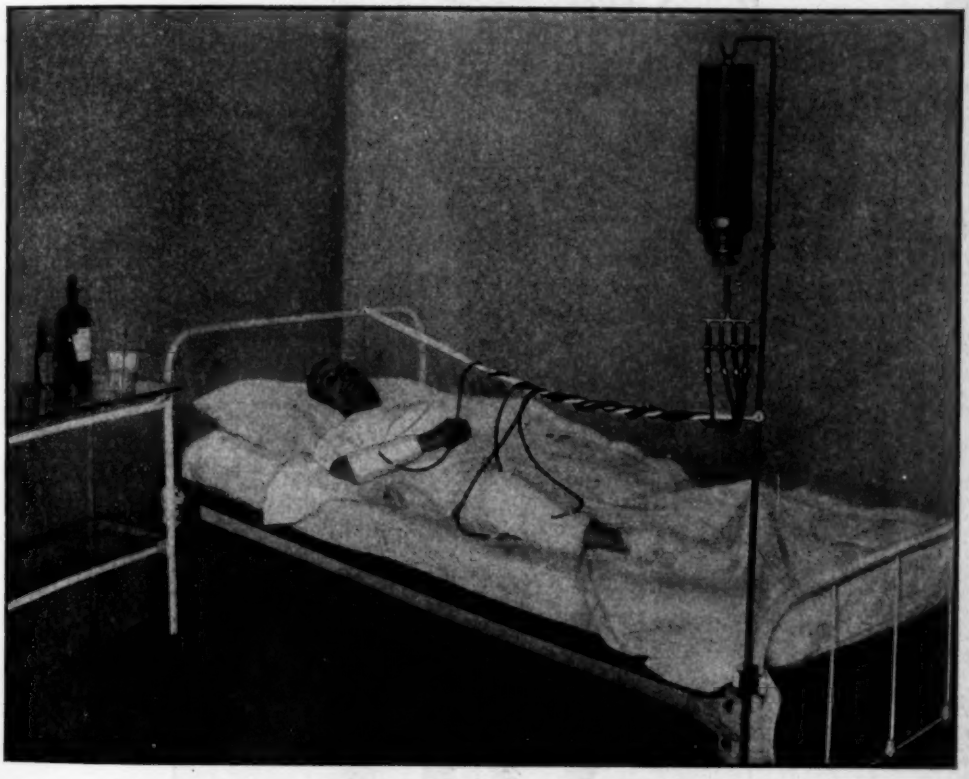

FIG. 4-A. Improved apparatus in use. Note that the instillation tubes may be freely manipulated while dressing the wounds without interference from the distributing tubes, sight-feed bulbs or clamps, all of which are well elevated above the patient.

below the knee, it would be necessary to employ one complete apparatus for irrigating each wound. The disadvantages with regard to lack of simple attachment, insertion of instillation tubes, etc., discussed in describing the apparatus pictured in Fig. 2, apply also to the Rose irrigator.

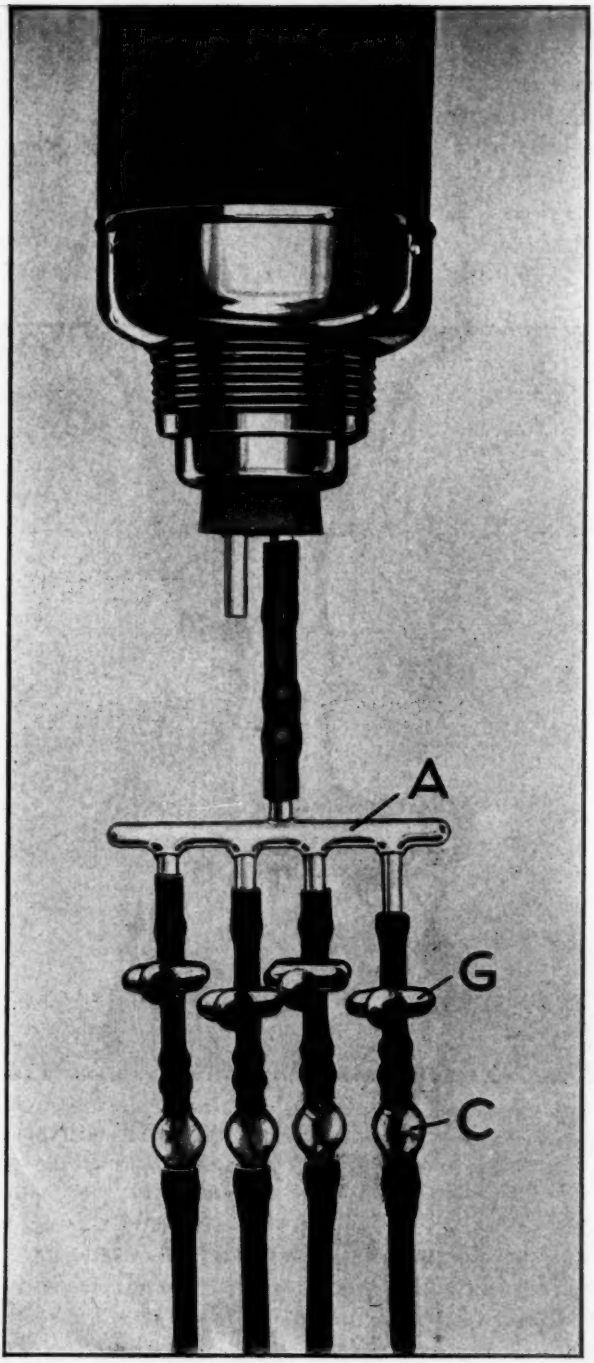

FIG. 4-B. Shows arrangement of distributing tube (*a*), individual sight-feed bulbs (*c*) and clamps (*g*). Note that ***rate of flow can be observed and controlled in each individual tube.***

DETAILED DESCRIPTION OF IMPROVED APPARATUS.—As stated before this apparatus was designed to overcome all of the limitations referred to above, and the following illustrations and descriptions will bear out the claims for its superiority over existing devices.

Figure 4A shows the apparatus at the bedside in actual use. The collapsible stand shown in detail in Fig. 6 can be attached to a bedpost of any size and is provided with a hook at its top from which the caloris bottle, (*e*) Fig. 6, is suspended by means of the hinged eye (e^1) which is riveted to the base of the bottle. The object of using a caloris bottle as a reservoir is to enable supplying the solution at a body temperature and to permit of using this apparatus for hypodermoclysis, Murphy drip, or for irrigating wounds with hypertonic salt solution.

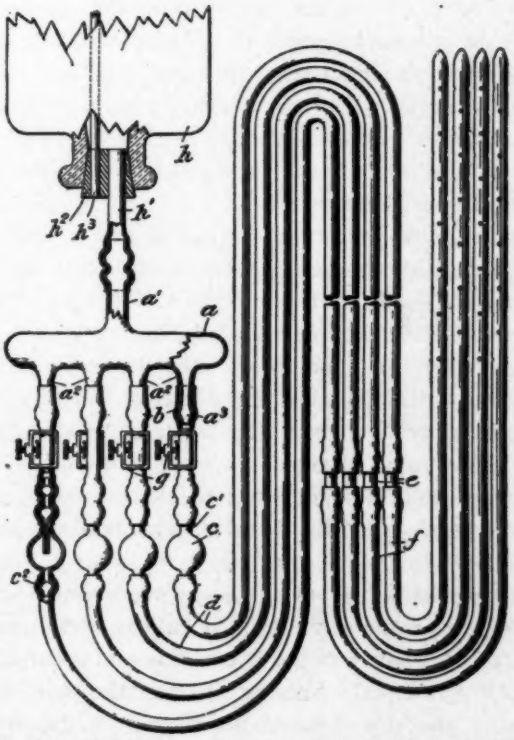

FIG. 5. Graphic illustration of improved instillation apparatus. Each connecting tube is supplied with an *individual clamp and sight-feed* which makes it possible to accurately regulate the flow to *each* instillation tube. See text.

Fig. 5 shows the essential features of the apparatus, consisting of the glass distributing tube (a) to the upper end of which is sealed the short tube (a^1), used for connecting the caloris bottle (h) with the distributing tube by means of the pipe (h^1) which passes through the stopper of the bottle. A glass tube (h^3) used as an air inlet also passes through the stopper and extends to the bottom of the caloris bottle. A number of tubes (a^2) are blown into the lower section of (a) and although four of these tubes are shown in the illustration it is possible to vary this number according to the number of instillation tubes that may be required. The lower ends of the tubes (a^2) are suitably enlarged so that rubber tubing (b) can readily be slipped on, thus serving as connections between the distributing tubes (a) and the glass sight-feed bulbs (c). By means of these sight-feed bulbs (c) the rate of flow of the solution into the instillation tubes can be readily observed. The short extensions (c^1 and c^2) on the sight-feed bulbs readily permit connection with the tubes (b) and (d). The connecting tubes (d) are readily attached to the instillation tubes (f) by means of short glass pipes (e) which have enlarged sections to insure snug union.

The rate of flow of the solution from the reservoir to the instillation tubes as observed through the sight-feed bulbs is adjusted by means of the screw clamps (g).

When the apparatus has been adjusted and is ready for use the solution is poured into the caloris bottle, which is then corked and suspended from the properly elevated stand, thus insuring a free gravity flow. The liquid passes from the reservoir into the distributing tube (a) and from there into the individual tubes (a^2) which connect as previously described with the instillation tubes (f).

The surgeon, knowing the particular requirements of each wound or portion thereof, can adjust the rate of flow of the solution from each instillation tube independently of the others by means of the screw clamps (g), making his observations at the sight-feed bulbs (c).

By attaching the distributing tube (a), clamps (g) and sight-feed bulbs (c) near the outlet of the caloris bottle the only appreciable temperature change in the solution would occur in the connecting tubes (d) between the clamps (g) and the point of instillation, as the flow of the liquid from the clamp to the wound is continuous and free. Therefore, the loss in temperature under ordinary conditions between these two points can be readily determined.

Experiments have shown that in order to instill the solution at body temperature it should be warmed to 75° to 85° C. before being placed in the caloris bottle.

When used for hypertonic salt solution, hypodermoclysis or Murphy drip this apparatus is superior to other appliances in that it offers no difficulty whatever for furnishing the liquid for irrigation at any desired temperature. The connecting tubes are made of special thick-walled rubber tubing having a very fine bore, thus causing a minimum loss in temperature in the solution as it travels from the reservoir to the site of irrigation.

Advantages of New Form of Instillation Tubes.—It has been found that the usual style instillation tube with one end closed by tying as shown in Fig. 1 is unsatisfactory and often rather difficult to insert. Instillation tubes in which the ends are closed by rounded glass or hard rubber plugs are also undesirable because the plugs sometimes become detached when the tubes are withdrawn and remain in the wound as foreign bodies. It is advisable therefore to use instillation tubes of the style shown in Fig. 5 (*f*) which have a rounded closed end such as is found on the ordinary catheter. The large hole of the catheter is, of course, replaced by a series of very small lateral holes extending over about half the length of the tube. Instillation tubes of this type can readily be inserted into any wound with a minimum of pain and they also eliminate the possibility of any foreign bodies being left in the wound when they are withdrawn.

The fact that these instillation tubes are supplied with the solution from individual connecting tubes in which the flow can be accurately adjusted, makes it possible to insert them from any angle into wounds located in different parts of the body. Furthermore, their use permits treating at the same time, with one apparatus, wounds on upper and lower surfaces of the body no matter whether they are in a parallel or perpendicular position to these surfaces. The instillation tubes in other forms of apparatus cannot be placed in more than one position without causing the formation of kinks in the tubes and otherwise interfering with the proper supply of the solution.

The two-way circular tubes sometimes sutured to the edges of superficial wounds for the purpose of supplying the solution to all portions of them do not always answer the purpose, because the surface is usually not flat. One section of the tube is therefore on a

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somewhat higher plane than the other end and the solution naturally runs to the lower level, thus being carried away from the wound rather than being evenly distributed over the entire surface. With

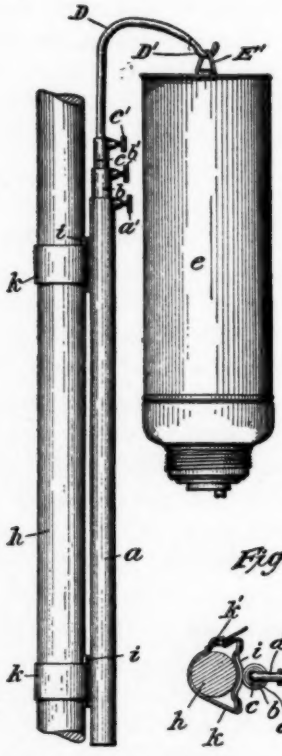

Fig. 7.

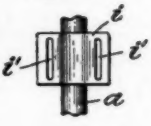

Fig. 8.

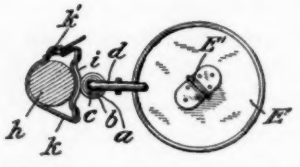

FIG. 6. Telescoping portable stand for supporting caloris bottle containing irrigating solution which can be attached to any size bed-post without danger of marring same. See text.

FIG. 7. Illustrates construction of metal lugs *i* containing slots i^1 through which the straps *k* pass and fasten stand to bed-post.

FIG. 8. Shows the relative position of stand *a*, *b*, *c*, *d*, metal lug *i*, strap *k*, and bed-post *h*.

the improved apparatus it is possible to fasten one instillation tube along the upper edge of the wound and another along the lower edge, and as each instillation tube is attached to an individual connecting tube which receives its supply of solution independently of the others, uniform distribution to all parts of the wound is possible.

In order to avoid the necessity of erecting a wooden framework over the bed of the patient as a means of support which is necessary when using other forms of apparatus, a small, strong, portable, collapsible stand has been devised which can readily be attached to bed-posts of any size by means of the device indicated in Fig. 6 (*k*) without danger of disfiguring the bed-post.

As will be noted from Fig. 6 the caloris bottle may be raised or lowered independently of the clamps which engage the bed-posts by means of the thumb screws (a^1) (b^1) (c^1). It can also be seen in this figure that the outermost tubular section (*a*) of the support has attached near its ends two metal strap lugs (*i*) which in cross section conform generally to the contour of the bed-posts and are provided near their edges with vertical slots (i^1), Fig. 7, through which the straps (*k*) made of webb belting are passed before being wound about the bed-post (*h*), Fig. 8, and fastened by means of the buckle (k^1).

Supplying Solution Directly to Wounds.—After the collapsible stand has been attached to the bed-post and the apparatus has been adjusted for use a gauze bandage is stretched from the middle of the stand to the opposite end of the bed. This acts as a support for the connecting tubes. (See Fig. 4A.) The tubes are coiled around the bandage to points directly over the wounds to be supplied with the solution. From these points the connecting tubes descend vertically to the instillation tubes. This simple device entirely eliminates the necessity for building a wooden framework over the bed as is required with many of the other appliances and permits the adjustment of the instillation tubes to any angle or location as referred to above.

If the splendid results obtained by Carrel are to be repeated by others, the technic must be vigorously carried out and the solution used must be very carefully prepared. It has been estimated that the "Dakin" solution represents but twenty per cent. of the cure and the technic of Carrel represents eighty per cent. It is believed that the apparatus herein described will aid very materially the beginner in the technic of wound sterilization.

A REPORT OF THE RESULTS OF THE USE OF THE CARREL-DAKIN SOLUTION ON MOUTH SURGERY.[1]

By H. M. Beck, D.D.S.

The use of the Carrel-Dakin solution as a germicide and mouth disinfectant was first suggested to the author of this article by Dr. A. T. McClintock, a bacteriologist. Dr. McClintock stated that he had used Dakin's solution in the mouth in several cases, with most gratifying results. This suggestion led to an investigation, and finally to the adoption of the solution in all of our surgical cases, to the exclusion of all other drugs, including iodine. Iodine has been considered a panacea for all mouth diseases and infections for years, and it is only recently that investigation has proved that iodine, therapeutically or bacteriologically, is anything but an ideal agent. The use of the drug has been continued only because we knew of nothing more efficient and less dangerous to take its place. Chemical sterilization of a wound or lesion can only be carried out with a strong germicide which is a non-toxic and non-irritating antiseptic. Less than 7 per cent. iodine is too weak antiseptically, and 7 per cent. or more is too irritating and toxic to be used on the delicate mucous membranes.

What is true of iodine is also true of mercury bichloride and the carbolic group. It is a common practice of our profession to disinfect an area by scrubbing it with iodine just before injecting novocaine-suprarenin. The soreness, irritation, swelling, and pain which often follow are always attributed to the novocaine. Careful observation of the action of novocaine-suprarenin for three years justifies the statement that the novocaine is not the offending cause, and examination of the part will show irritated, inflamed, sloughing mucous membrane such as could only be caused by an iodine burn.

Dakin's solution is so much more efficient, less irritating, and less toxic than any antiseptic we ever used that we feel justified in publishing the results of our investigations, with the hope that others will try it intelligently and scientifically, and report the results of their investigations.

Use of the Solution in Pyorrhea.—One of the diagnostic signs of pyorrhea is inflamed, bleeding gums about the necks of the

[1] Abstract of article in *The Dental Cosmos*, October, 1917.

teeth. Often the inflammation is so marked and the bleeding so excessive that thorough prophylactic treatment is almost impossible. To overcome this condition, have the patient rinse the mouth every four hours with Dakin's solution for two days before presenting himself for the prophylactic treatment. The operator will find, after two days' treatment with Dakin's solution, that most of the inflammation and bleeding has subsided, and that the heretofore painful scaling and polishing of the teeth can be effected with little or no pain. After the prophylactic treatment use the solution in a glass syringe with a platinum needle. If the solution reaches the point of infection without being diluted with saliva the flow of pus will stop in a few hours. If the pus persists, the solution has not reached the seat of infection and the treatment should be continued. In extreme cases of pyorrhea where very large and deep pockets are found we have used the following treatment with most gratifying results: First, the pocket and surrounding tissue is walled off with cotton rolls and kept as dry as possible. Then a small pellet of cotton is saturated with Dakin's solution and inserted into the pocket, packing it about the neck of the tooth and well down into the pocket. Caution: The packing should not be tight. This dressing should be changed every four hours for two days, and usually the flow of pus will cease in two or three treatments. If the flow of pus stops, the cotton dressing should be omitted but the pocket should be flushed out with the solution for three or four days. In several bad cases where it seemed impossible to reach the point of infection with Dakin's solution, we have inserted a fine wire into the pocket, made a radiograph to ascertain the location and depth of the pocket, and with this help have succeeded in getting Dakin's solution to the seat of infection and have been able to arrest the flow of pus.

Treatment Following Root Amputation.—Spray the wound every two hours with Dakin's solution. Use no other drug or treatment, and the result will be all that could be desired. Caution: Do no use more than 10 lb. pressure in the atomizer; a spray forced into a wound of inflamed tissue with 25 lb. or 30 lb. pressure is most injurious.

Method of Disinfecting the Mucous Membrane Before Hypodermic Injections of Novocaine-Suprarenin.—In conductive anesthesia or in local injections, spray the mouth first with Dakin's solution, and after a few minutes wipe off the mucous membrane with 70 per cent. alcohol about the area where the needle is

to be inserted. Just before injection, again wipe the point of insertion with Dakin's solution. Caution: Do not scrub the part to be disinfected with Dakin's solution—simply wipe it off; and do not use Dakin's solution immediately before or after using iodine, menthol, benzol, or any of the numerous iodine preparations.

Before using the solution in the mouth we would advise those who are interested in the Carrel-Dakin method of wound sterilization to read the splendid paper by Dr. W. O'Neil Sherman, published in the March, 1917, issue of *Surgery, Gynecology, and Obstetrics,* also in the *Pennsylvania Medical Journal* for June, 1917. On July 31st the writer had the privilege of meeting Dr. Sherman and discussing a paper written by him and read before the Schuylkill County Medical Society at Buckwood Inn. We were very much impressed with Dr. Sherman's paper and with the very great stress he laid upon the necessity of using the Daufresne technique in preparing the solution, of always using a fresh solution, and of following the technique of Dr. Carrel *verbatim* in using the Carrel-Dakin solution in the treatment of wounds.

PHARMACEUTICAL SERVICE IN THE FRENCH ARMY.[1]

By George M. Beringer, A.M., Ph.M.

The establishment of a properly organized and well equipped pharmaceutical corps as a branch of the Medical Department of the United States army is urged as a national necessity by those who are acquainted with the unscientific methods under which potent drugs are controlled and the dispensing of medicines is carried on in our army. In this respect, we can profit by learning the experiences and studying the methods of the foreign armies, those of our allies and the enemy alike, for supplying the medical needs and providing for the hygienic care of their soldiers.

In anticipation of the necessities of war, both Germany and France, in recent years, again reorganized their respective army pharmaceutical services and greatly extended the duties assigned to the pharmaceutical corps. Not only are these corps charged with

[1] Read at the Joint Meeting of the Philadelphia Branch of the American Pharmaceutical Association and the National Pharmaceutical Service Association, October 8, 1917.

the duty of providing the medical and surgical supplies by purchase or manufacture and with the care, distribution and dispensing thereof, but they likewise make the sanitary, clinical and chemical examinations for the armies and in reality these pharmacists are the chemists of the military service as well as of the sanitary service. Very properly courses of special scientific study and training have been established for the education of the personnel of these corps and under the regulations the military pharmacy student must apply himself to the studies and in the required examinations demonstrate his fitness for the service. These rival countries in the existing war, have exhibited to the world the value of modern pharmaceutical and chemical service to the army.

The French pharmaceutical military service has rendered to that country, during this war, services that are inestimable, whether considered solely from the monetary value to their nation or as professional and humanitarian benefits. The Pharmaceutical Corps has been publicly commended "as having proved to be one of the most effective, active and intelligent corps of the French Army."

The organization and the duties performed by the French Army Pharmaceutical Corps will serve as a model for the proposed pharmaceutical corps of the United States army. The War Department is now actively engaged in organizing an American army in accordance with the plan of the French army organization and our forming units are being drilled according to the French army methods. Would it not be very appropriate at this time for the War Department to likewise adopt our ally's scheme of pharmaceutical corps cadre?

The history of the pharmaceutical corps of the French army, the services performed therein by many eminent pharmacists, the contentions necessary to maintain its standing and to overcome the jealousies of other branches of the sanitary service, the duties assigned from time to time, and the present status and greatly extended usefulness of the service, are interesting subjects of study which can here be given only a cursory consideration.

The writer is very largely indebted for the facts presented in this paper to M. Georges, Chief Pharmacist, Military Hospital for Instruction, Val de Grace; L. Guignard, Honorary Director École Supérieure de Pharmacie, Paris; Captain Carl Boyd, Military Attache, American Embassy, Paris, and above all to Léon Varenne, Phar.D., Pharmacist Major of the Army, for an autograph copy of his book on the Pharmaceutical Service in the Army.

"Organisation et Fonctionnement du Service Pharmaceutique de L'Armee" by Léon Varenne, Docteur en Pharmacie—Pharmacien Major de L'Armee. Preface by De M. le Professeur P. Cazeneuve Senateur du Rhone.

The history of the French military pharmacists can be traced back to the time of Richelieu. In 1630, the regulations of the principal army hospitals defined the personnel of the hospital staff and the duties of the physician, surgeon and pharmacist.

The law of December 20, 1718, instituted officially the sanitary service and regulated precisely for the first time the duties of the hospital corps. The regulations of January 1, 1747, made provision for the formulas of the pharmacopœia of the Royal military hospitals with a list of drugs to be included in their supplies and further provided for commissions for the officers to be issued by the Secretary of War.

The acts of 1774, 1775 and 1777 further organized the sanitary service in the districts of Strasburg, Metz and Lille, with the grades of professors of medicine, surgeon-major and apothecary-major, the commissions for the officers of the Sanitary Council being respectively physician-inspector, surgeon-inspector and apothecary-major. Even at that early date the apothecary-major was charged with the duties of analyzing the remedies and providing all medicines.

In 1788, important modifications were made in the organization of the sanitary service. A sanitary council was formed consisting of six superior officers of the sanitary service; two physicians, two surgeons and two pharmacists (Bayen and Parmentier). At the same time, the number of the military hospitals was increased, the service in the regimental infirmaries extended and necessarily the duties of the physicians and pharmacists considerably augmented.

It is admitted that, at this period, medical influence was in the ascendency and, owing to the excessive reduction in the number of pharmacists and duties that did not bring them in such close contact with the army, pharmacy was subordinated to medicine. It was the laboratory of Bayen, from which came, in 1765, the memorable analyses of the springs of Bagnères de Luchon and, in 1774, the essay on experiments with the mercurial precipitates, that overthrew the doctrine of Stahl and started chemistry along new lines, that prepared the way for the emancipation of pharmacy. Subsequently Medical Inspector Bégin, in his "Studies of the Military Sanitary Service," declared "that the sciences of medicine and

pharmacy were established on a perfect equality, lending mutual support and coöperating together while proceeding separately, nevertheless, in all the services which they render to humanity and in extending the domain of knowledge, they are equally honorable."

The situation created by the law of 1788 was fortunately modified by subsequent regulations and decrees which ameliorated the situation materially and hastened a reorganization of the sanitary service in 1796. The law enacted that year suppressed the Sanitary Council then in existence and their functions and powers were assigned to six inspector generals; two physicians, two surgeons and two pharmacists (the same Bayen and Parmentier), with equal authority over the three subdivisions of the sanitary service. The right of honorable distinction had already been accorded to all these branches of service by the regulations promulgated in 1792 and so the absolute equality of the three professions was established.

In 1803, an attempt was made to reduce the standing of medicine and pharmacy and advance that of surgery; the proposition being to have six inspector generals, three to be surgeons, two physicians and only one pharmacist. Subsequently the war department reduced the number of hospitals and neglected the sanitary service to a point where Talleyrand in his speech to the French armies on April 2, 1814, denounced a policy that expected the soldiers of France "to withstand the fire of the enemy without having subsistence and without hospitals."

During this period the sanitary cadres were very variable, depending largely upon the needs of the army in time of peace or in time of war. In 1812, the effective military pharmacists numbered 1,011 in the total of 5,112 officers of the sanitary service. In September, 1824, the personnel of the entire sanitary service numbered only 917 officers, classified as surgeons, 711; physicians, 59; and pharmacists, 147. By the act of August 12, 1826, this effective was again modified, the number of physicians and surgeons was increased, and the number of pharmacists decreased. This act, however, established the grade of pharmacist aide-major.

In 1852, the sanitary service of the army was arranged into two parallel and independent corps, medicine and pharmacy. The modern history and development of these corps can be stated to have been then inaugurated as a basis for fusion had been established and there was at least a temporary cessation of the rivarly and jealousies that had so long existed.

In 1860, Marshal Vaillant, minister of war, decreed that the two corps, medicine and pharmacy, should be of equal importance, irrespective of their total effectives. By this decree the pharmaceutical cadre consisted of 159 officers with the following grades:

1 Pharmacist-Inspector, with the grade of General of a brigade.
5 Pharmacist Principals, 1st Class, with the grade of Colonel.
5 Pharmacist Principals, 2d Class, with grade of Lieutenant-Colonel.
36 Pharmacist-Major, 1st Class, with grade of Chief of Battalion.
42 Pharmacist-Majors, 2d Class, with grade of Captain.
55 Pharmacist Aide-Majors, 1st Class, with grade of Lieutenant.
15 Pharmacist Aide-Majors, 2d Class, with grade of Second-Lieutenant.

The shortcomings of the sanitary service during the Franco-German war were severely criticized and a strong demand made for its reorganization. The medical corps demanded exclusive direction and autonomy over the service and that the pharmaceutical corps should become the subordinate and in consequence a systematic reduction of the authority of the military pharmacists. The eminent chemist, J. B. Dumas, gave the weight of his scientific authority in favor of placing the direction of the sanitary service exclusively under the medical and consequently the subordination of the military and administrative influence of pharmacy. The medical inspector-general Legouest, while ardently advocating the preëminence of the medical over the pharmaceutical, declared that "the project must respect the cadre and rank of the military pharmacists and that there must be preserved to pharmacy all its rank, its appropriation, the conditions of advancement and the various functions of its proper service."

In 1882, a new law was promulgated for the administration of the army and with the amendment thereto of 1889, defined the authority of the military sanitary service and to the present time this governs the duties of the service. This law for the administration of the army divided the military service into five branches, the sanitary service being the last specified. Prior to this time, the military sanitary corps was part of the commissary department. It now became a new autonomy comprising the military physicians and pharmacists under one proper hierarchy and with the grades corresponding to those of the military hierarchy and the officers of the sanitary service enjoying all the advantages of other officers.

Under this law the pharmaceutical cadre is composed of:

1 Pharmacist-Inspector, with rank of General of a brigade.
4 Pharmacist Principals, 1st Class, with rank of Colonel.
5 Pharmacist Principals, 2d Class, with rank of Lieutenant-Colonel.
30 Pharmacist-Majors, 1st Class, with rank of Chief of a Battalion.
45 Pharmacist-Majors, 2d Class, with rank of Captain.
20 Pharmacist Aide-Majors, 1st Class, with rank of Lieutenant.
10 Pharmacist Aide-Majors, 2d Class, with rank of Second-Lieutenant.

This total of 115 was soon seen to be insufficient, as was shown by the sanitary service in Morocco. When the necessity arose, the reserve pharmaceutical corps was to be mobilized. In 1914 this reserve force numbered 1,229 and, in the territorial army, 1,020, a total reserve corps of 2,249.

The pharmaceutical corps in the French army is recruited in part from students of pharmacy who enter the army sanitary service and continue their studies while in the army, and in part from pharmacist graduates who hold first-class diplomas. The undergraduate who enlists in this service must establish that he is a citizen of France either by birth or by naturalization, that he is over 18 years and less than 23 years of age, must have passed the preliminary scholastic examination and have his fitness for military service certified to. As a student he is allowed an annual pension, while attending the school of applied medicine and pharmacy, of 1,000 francs which, it is stipulated, is allowed on condition that he complies with the rules of the school and passes the examination for admission to the service, otherwise it must be refunded to the war department.

The examination for the first year studies of the military pharmacy student, covers a composition on some question of physics or elementary inorganic chemistry; the preparation of one or more medicinal formulas included in the Codex, with an examination on these preparations; the compounding of prescriptions; the determination of fifteen plants or parts of plants pertaining to materia medica and ten chemical medicaments or galenicals and examinations on these.

The examination at the end of the second year includes the following: a composition upon an inorganic or an organic chemical

question; examinations in physics; organic chemistry; mineral poisons; galenical pharmacy; botany (natural families of phanerogams); and the natural history of medicaments. The jury composed of the Pharmacist-Inspector (as president) or, in his absence, a Pharmacist Principal of the first class, a professor of chemistry and toxicology of a School of applied Military Sanitary Service and a Pharmacist-Major, 1st Class, classify the students according to the merits of their work and certify to the ministry the list of candidates eligible for appointment to the service.

Pharmacists possessing first-class diplomas may enter the pharmaceutical corps from civil life with a grade of Pharmacist Aide-Major, 2d Class. Such candidate, however, must first comply with the following conditions: be a citizen of France, either by birth or by naturalization, be not over 28 years of age; his aptitude for the service must be certified to by an army physician of not less grade than Physician-Major, 2d Class, enlist for not less than six years in the active sanitary service of the army and accept appointment to the grade of Aide-Major, 2d Class, and in addition must pass an examination to determine his scientific and professional knowledge.

The candidate meeting these rather rigorous requirements for enlistment in this corps with the grade of Aide-Major, 2d Class, receives an indemnity of 575 francs to provide for his first equipment with a condition that this must be refunded if he quits the service before completing his sexannual engagement. The pharmacists are expected to continue their studies and to obtain promotion to higher grade a successful examination is necessary. Each advancement in the corps is dependent upon a minimum number of years of effective service and seniority of service is presumably respected in the advance appointments.

A Pharmacist-Major, 2d Class, is expected to serve not less than two years before advancement.

A Pharmacist-Major, 1st Class, is expected to serve at least four years in the preceding grade.

A Pharmacist Principal, 2d Class, is expected to serve at least three years in the preceding grade.

A Pharmacist Principal, 1st Class, is expected to serve at least two years in the preceding grade.

A Pharmacist-Inspector is expected to serve at least three years in the preceding grade.

The officers of the Pharmaceutical Corps may be retired with

pension on arriving at specified age limit for their respective grades as follows: the Pharmacist-Inspector, at 62 years; the Pharmacist Principal, 1st Class, at 60 years; the Pharmacist Principal, 2d Class, at 58 years; the Pharmacist-Major, 1st Class, at 56 years; the Pharmacist-Major, 2d Class, at 53 years; and the Pharmacist Aide-Major, either class, at 52 years.

The limits of this paper preclude the detailing at length of the divers duties assigned to the pharmaceutical corps in time of peace and still more so, the greatly increased and many special services that have been required in time of war.

The military hospitals are under the command of the medical officers. The "head physician" usually follows the custom of entrusting to the head pharmacist, whose official authority extends only over the pharmacists, assistants and medical supplies, the maintenance of discipline and the command of the civil and military attaches of the hospital so that the ranking pharmacist generally becomes the administrative officer charged with the policing, and the commissary as well as the necessary pharmaceutical duties of providing the medical and surgical supplies and attending to the compounding of all medicines and their administration.

The regulations require that the pharmacist must verify the quality of the medicines supplied and select the most suitable conditions and places for their preservation, adopt a system that will prevent errors, see that, at the time of dispensing, the medicines comply with the requirements of the "Military Hospital Formulary" and are labelled according to the requirements, maintain the records of prescriptions and of the supplies according to the official forms. He is likewise charged with the duty of delivering medical supplies to the regimental infirmaries and veterinary hospitals. He must supervise the preparation of food for the invalids. Must systematically care for and examine the supplies of the sanitary service and must receive the various supplies for the clothing and subsistence. He must make all examinations of foods and medicines and those requested by the medical officers for the diagnosis of disease, the hygiene of the troops and the divers services of the army. All of these analyses must be properly recorded with the date, the reason for the investigation and the results set forth. The analyses for the hospital service, with results and observations, are to be promptly transmitted to the physician in charge.

Finally, the pharmacist is charged with the duty of making the meteorological observations.

With the outbreak of the war and the greater demand consequently for military pharmacists, the government instituted a pharmaceutical section in each of the schools for the Army Sanitary Service and the pharmacist recruit was given the choice of attending at any one of these situated at Paris, Montpelier, Nancy, Bordeaux, Lille, Lyon, and Toulon. The faculties of these were composed of medical, pharmaceutical and chemical teachers and many leading pharmacists were detailed to duty as teachers.

The disposition of the pharmaceutical corps was necessarily changed by the existing war conditions and the demands made upon the service by the exigencies arising have been enormous and could not have been foreseen. The objects sought to be attained by the organization of the sanitary corps in the war were: (1) providing for the preparation and execution of measures of hygiene and prophylaxis; (2) the prevention and treatment of sicknesses incident to the march and to the camp; (3) the first treatment in combat, the relief and removal of the wounded irrespective of nationality; (4) hospitals for treatment of the sick and wounded; (5) the replacement of the personnel and the re-supplying of materials of the sanitary formations.

In each of these the pharmacists are assigned specific duties as for example an ambulance unit in the infantry is provided with six physicians and one pharmacist.

In the campaign, the pharmacists are assigned in the front rank giving service to their regiments and with the infantry ambulance; in the rear, with the ambulances of the section; the evacuation hospitals; the sanitary trains, either permanent or improvised; the supply depots, the reserves of the sanitary personnel.

The pharmacist is charged with the duty of determining the potability of the water supplies and generally likewise acts as bacteriologist of the division. The specified lists of apparatus and reagents needed for these tests are transported according to the regulations by the litter bearers.

It is the mission of the pharmacist to attend the ambulances during battle, to render first aid, remove the wounded, to supply the hospital material and attention at the field hospital. The pharmaceutical personnel by the decree of April 26, 1910, has become the principal formation of the infantry ambulance. This consists of the following under the command of the pharmacist: a detachment of four attendants as litter bearers and nurses, one corporal and a detachment of four men of the military train.

The material comprises three wagons of the sanitary service to transport seven paniers of dressings, seven cases and nineteen bales of hospital materials.

The important duties assigned to the sanitary service in the rear are the evacuation hospitals, sanitary trains, the war infirmaries, the stations for the convalescents and maimed, the reserves for the personnel of the sanitary service of the army, the reserve material for the service, and the supply stations.

Each evacuation hospital is provided with two complete infantry ambulance outfits and provisions for two sectional hospitals and two disinfecting apparatus and supplies of disinfectants, and fumigating material and two pharmacists are assigned thereto.

The medical supply stations are under the direct command of a pharmacist with a personnel of one sub-officer, one corporal and seven attendants. The various hospitals, temporary, permanent and auxiliary, all meeting at times the local civil demands, draw their supplies from the nearest supply station. An important duty of the pharmaceutical corps is the continuous supplying of the medical needs of the various formations of the sanitary service whether at the army front, in the rear or in the interior or in the territorial hospitals and stations.

The conservation of supplies of important medicaments so that the needs of the army and the civilian population were alike provided for in this war, was one of the greatest national services performed by the Pharmaceutical Corps of the Army.

The regulations provide that the pharmacists in a campaign must assure that the pharmaceutic service conforms to the instructions and to their spirit. Under the orders of the Chief Physician, they must verify the nature and quality of the medical substances and provide these by purchase, manufacture or requisition; they must participate in the inspection of the foods and beverages supplied to the camps and cantonments; must examine all the medicines when received and make monthly reports of receipts and disposition of the supplies on the official forms provided. During the war, the work of the pharmacist has been extended to prepare many of the sanitary materials and medicines the necessity for which has been established by experience. Among these newer preparations may be mentioned sterile solutions in ampoules, artificial serums and compressed oxygen.

The French War Department has taken advantage of the apti-

tude of the pharmacists and their professional education and has utilized them as chemists and hygienists. Every means that could be developed by science was applied by German ingenuity to the production of barbarous war instruments and methods. The irritating, asphyxiating and poisonous gases and the pollution of water supplies are notable examples of the methods initiated by the enemy and requiring scientific counteraction.

This demanded extension of the sanitary service could not be imposed upon the military physicians who were too fully occupied with the problems of their own practice and, likewise, it was admitted that they were but poorly prepared for this field of work. Consequently, it became the duty of the pharmacists of the sanitary service to make the innumerable chemical, microscopical and bacteriological examinations necessary. It was soon learned that the analytical outfit accompanying the ambulance was insufficient for satisfactory work under the conditions existing. A complementary cadre was organized consisting of 200 additional pharmacist aide-majors and 220 portable laboratories were equipped. These constitute a special formation of the sanitary service on the front and they are charged with the constant daily surveillance of the water consumed by the troops and the providing for the purification and sterilizing of any that are doubtful or purposely contaminated by the enemy.

Despite this scientific work which became more and more overwhelming, and the complex problem of regularly furnishing the medicines and surgical supplies for all of the sanitary formations, some other researches have been carried on and a number of suggestions of importance to the industries of the nation have emanated from this corps. Withal there has been no abatement of the rigid rules of administration and the strict methods of making records and the rendering of surgical assistance as well as purely pharmaceutical service.

The writer is indebted to L. Guignard for the accompanying diagram which graphically portrays the service that the pharmaceutical corps of the French army is rendering to that nation.

The preface to the able work of Major Léon Varenne was written by Prof. P. Cazeneuve, senator from Rhone. It is a concise review of the service being performed by the military pharmacists. He pays a deserved tribute "to their devotion and patriotic service, although silently given, to which the historian must in jus-

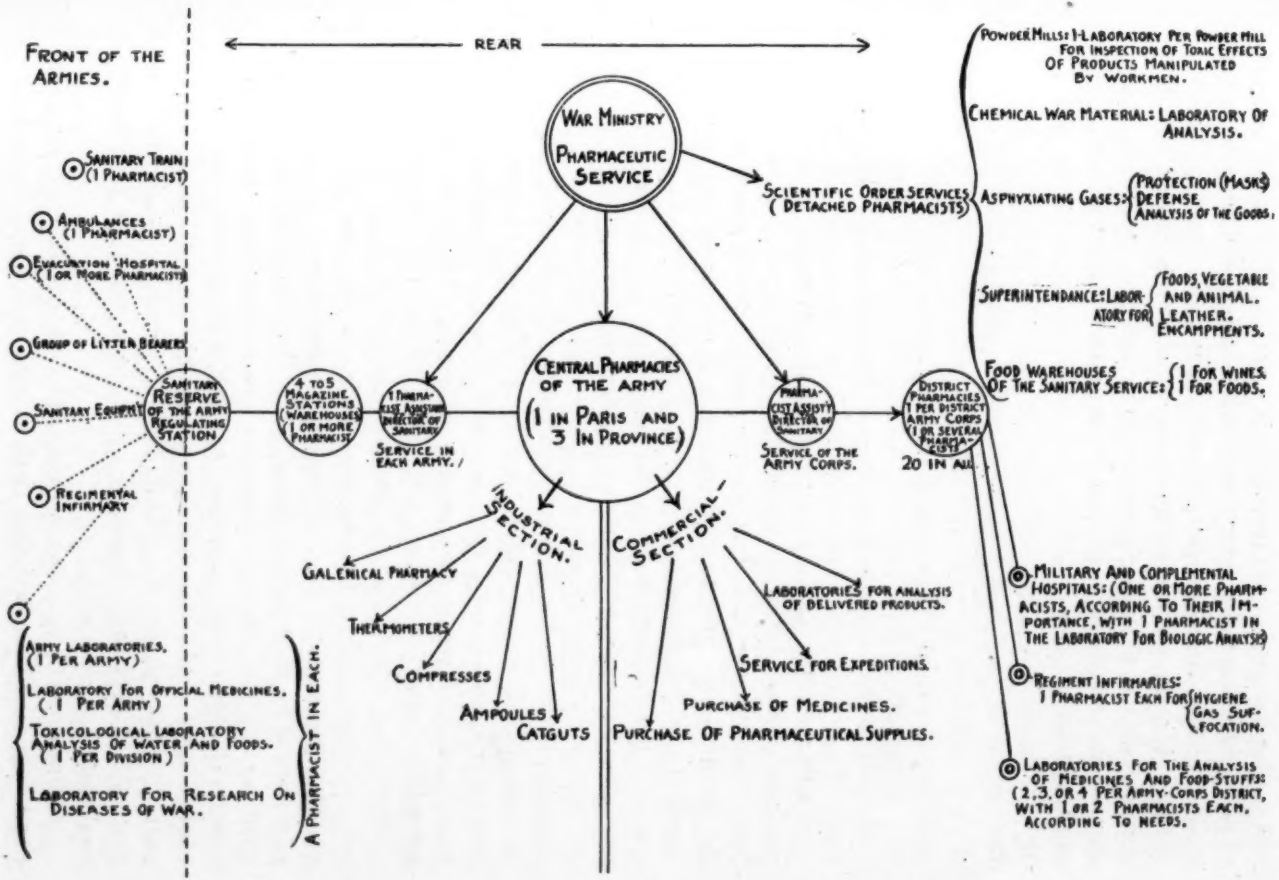

DIAGRAM EXHIBITING THE PHARMACEUTICAL SERVICE IN THE FRENCH WAR DEPARTMENT.

tice render homage." He states "this work of M. Varenne makes us love and respect this select corps which have contributed, in their modest sphere, most eminent service to save the country." No one reading even the preface of this book should longer doubt the importance of the pharmaceutical corps in modern warfare and the absolute necessity for such service to protect the health and lives of the troops.

PHARMACISTS AND THE WAR.

By H. M. Whelpley, Ph.M., St. Louis, Mo.

(Read at the 1917 meeting of the Missouri Pharmaceutical Association.)

Twelve months ago we met here and expressed privately our opinions of the human slaughter then going on in the old world. Since then, the war cloud has extended until it is now easier to name the countries that are at peace than it is to enumerate the ones engaged in the greatest and gravest of all human conflicts. One year ago we congratulated ourselves that the United States was not in the struggle. Now we are preparing to enact the most important part in "making the world safe for democracy." These are, indeed, momentous days. The entire Western World will likely be a participant in the contest before our next Missouri Pharmaceutical Association convention. The six weeks' war which started in 1914 may continue far past that number of years. These are thought-provoking times for every citizen. The words "citizen" and "alien" have assumed a new and grave significance. It is not difficult to recognize our duty to our country and to the human race in our determination of "setting the world free." But we are pharmacists by training and occupation. The retailer has long practised serving the public. How can pharmacists now serve their country? What more have they to offer than physical fitness and eligible age? Will the pharmacists of the United States, as the years of war go on, be found digging trenches "somewhere in Europe" or will they contribute service dependent on pharmaceutical skill and knowledge?

Unfortunately, our own government does not give pharmacists the recognition in a war that they receive in France, Italy, Japan and Germany. But that recognition may come before this long-

drawn-out war is over. To-day, the pharmacist has the best opportunity for service in the navy. He also has a place in the army and one in the Public Health and Marine Hospital Service. All young men now in pharmacy, and particularly those just entering as apprentices should make certain of having sufficient preliminary education. They should push their studies in pharmacy at college or home, as the case may be. Those who cannot enlist will find plenty to do without going to war. The cry for drug clerks is already loud and will become more insistent as the drafts follow each other. The Medical Section of the Council of National Defence is pleading with physicians to enlist. We do not hear a government cry for more pharmacists but this country is just approaching participation in the war.

We are equally concerned with problems affecting the pharmacists who remain at home to follow their calling. It is needless to say that they will be affected by all general taxes, food regulations and other conditions imposed on the public at large. The special taxes on their business and high cost of drugs they should be able to pass on to the consumer, where these belong. I regret that some retail druggists continue, even at this late date, to sell drugs at figures based on original cost instead of market value. One druggist disposed of his entire stock of potassium permanganate at less per pound than he can replace the chemical per ounce. Similar cases occur daily in spite of drug price lists and market reviews. Pharmacists are quite as likely to make a success of drug gardens as they are to glut the market from their home truck gardens, but that is not saying much. No one should attempt a drug garden before consulting with the government Department of Agriculture, at Washington. In England, the British government reports quite as much success in harvesting wild drugs as in cultivating plants. It must be remembered that England has a much more restricted flora than is the case in the United States. We have a long list of indigenous drugs and the varied climate, latitude, altitude, etc., necessary for the growing of many exotic plants.

Now, to be more personal, I bring home to you the duty we owe the Missouri Pharmaceutical Association which secured our original pharmacy law of 1879 and for nearly forty years has had a hand in all pharmaceutical progress in Missouri. War or no war, we should continue to develop and expand the organization. Here we can solve practical questions in a practical way.

One form of recognition which our government has recently given pharmacy is to use the laboratories and faculties of certain colleges of pharmacy for testing medical supplies. This is done in lieu of establishing government testing laboratories.

Now, in conclusion, this horrible war is waged to make the world better and mankind secure from molestation. At the same time, let us gain for pharmacy a just position and recognition. We bewail the fact that our government is far behind Japan in using in war the talents of pharmacists. I quite agree with Hugh Craig, when he says: "The pharmacist has been so careless of his position in the social economy as to leave the public ignorant of his deserts."

I feel that we should not be satisfied after the war with a status quo ante but now look forward to better pharmacy after the war.

PHARMACISTS IN THE AUSTRALIAN ARMY.[1]

In view of the appointment of a joint committee to inquire into the position of qualified chemists in the Royal Army Medical Corps it is interesting to observe that in Australia the advantages of utilizing the services of pharmacists in the army are well recognized. Major Cossar—a Victorian chemist—explained the position recently as follows. The first commissioned appointment for pharmacists was made in November, 1915, when Lieutenant W. D. Williams was placed on the staff of the principal medical officer. In that position he has saved thousands of pounds to the country. Lieutenant Fox was next appointed quartermaster in South Australia, and Lieutenant George had been in the camp at Blackboy Hill in western Australia. In February, 1916, each of the State Pharmaceutical Societies was asked to nominate a senior pharmacist for each military district. Captain Cowley in Queensland, Captain Wadsworth in New South Wales were both appointed. Lieutenant Fox was made a captain in South Australia, and put on the staff of the principal medical officer. Captain Drake was appointed in Tasmania, and Captain Cossar was raised to the rank of major, and Captain Dartnell was appointed senior pharmacist of Victoria in his place. Since November, 1915, a base depot has been established in

[1] From *The Chemist and Druggist.*

each capital, which supplies the whole of the medical requirements of the forces, and great progress has been made in systematizing and economizing by this means. A beginning has been made in manufacturing. The base depots save the commonwealth thousands of pounds per month. Every military hospital of over 220 beds has now a pharmacist appointed as lieutenant-dispenser on the staff. Tasmania is the only state in which such a hospital does not exist. A military order has been made that no one is to dispense medicine and drugs unless he is a registered pharmacist. Numerous efforts had been made to secure commissions for the men who enlisted earlier and were abroad before these arrangements were made, and it is probable that shortly every hospital in the field with 440 beds or over (as against 220 beds in Australia) will be in charge of a registered pharmacist—as honorary lieutenant. Every hospital-ship now has a pharmacist as lieutenant-dispenser, and every transport carrying more than 500 men must have a registered pharmacist in charge of the dispensary. It is not possible to secure a commission for every pharmacist in the Army during the war, but every registered pharmacist-dispenser is now sure of the position of staff-sergeant. In the future when every young pharmacist will have military training in the Citizens' Army, it will never be necessary to train the special sergeant compounders.

STATUS OF CHEMISTS IN HOSPITAL UNITS.[1]

A correspondent, under date of July 17, 1917, writes us in part as follows:

"I was in the position last June of some uncertainty as to a choice of work for the following year. I had just been granted the degree of Ph.D. in chemistry from one of our leading universities, and, although several months past the registration age, was desirous of serving in a capacity most useful to my country. This left me undecided as to a choice of positions open to me. At this time the chief of a large hospital unit then in course of organization for service in France, called up the head of our chemical department, requesting a chemist for the unit, specifying a Ph.D. man capable of tackling any original problem that might arise at the base. The faculty selected me to see the physician in charge. In short, I was asked if I was a Ph.D., whether I had done any original research, and whether I would accompany

[1] Reprinted from *The Journal of Industrial and Engineering Chemistry*, August, 1917.

the unit as chemist—one of the enlisted men. My question as to a commission was met with the reply that only physicians and dentists were given commissions, but the possibility was mentioned that I *might* be offered a civilian appointment at fifty dollars a month.

"I refused, although I wanted very much to go. I had minored in bacteriology and had six years experience in health department laboratory work, and felt able to do good work with the unit. My refusal was for two reasons. The money borrowed for my education had to be repaid as soon as possible and that was impossible on a small salary with unknown expenses. Also, I felt that expecting to get a university-trained chemist and in return offering enlistment with orderlies, cooks and barbers was insulting to the dignity of the profession, when men no more highly trained—physicians and dentists—were granted a higher rank. I have written thus at length, partly on the urging of chemist friends. I am now adjunct professor of chemistry at the University of ———.

"Although disappointed at the lack of recognition accorded chemists by the army officials, I am writing you not in a spirit of complaint, but that you may have the facts of such a case, in the event that it should become advisable later for chemists to seek recognition.

"Another very similar case has just come to my attention here at ———, where a unit is now being organized."

The situation here revealed is amazing. We incline to the belief that this does not represent the deliberately formulated policy of the War Department, but that in the rush of unusual organization the matter has simply been overlooked. If, however, these surmises are incorrect, then we respectfully urge an early review of the subject by the officials in charge.

PHARMACOLOGIC SUPERSTITIONS.[1]

By Horatio C. Wood, Jr., M.D., Philadelphia.

(*Continued from page 460.*)

It is evident, therefore, that science lends no support to the use of lithium in medicine. Any judgment in favor of this element must be based solely on bedside experience. The clinical evidence in this disease is peculiarly unreliable; Magnus-Levi says, "Cool judgment is more difficult in the therapeutics of gout than of any other disease." In the first place, there is no criterion, save possibly the percentage of uric acid in the blood, which can serve as an index of improvement. In the second place, the disease is one

[1] Reprinted from the *Journ. Amer. Med. Assoc.*, Vol. LXVI, pp. 1067-1073.

which runs a very variable as well as chronic course; there are inexplicable spontaneous fluctuations in the severity of its manifestations. In the third place, the lithium is always employed in conjunction with other therapeutic measures, especially the ingestion of large quantities of water, and it is impossible for any one to say with positiveness whether any improvement which may have occurred has been due to or in spite of the lithium.

Nevertheless, regardless of its manifest fallacy, the lithium superstition still survives. This I believe is chiefly because of the beneficial effects of the so-called "lithia waters" in various conditions of disturbed nutrition. These waters, however, rarely contain more than one part of lithium in a million. That is, to get 5 grains of lithium, the patient would have to drink about 30 gallons of water! While I do not wish to deny the benefit of water in gout, I am quite certain, as must be any other rational human being who knows the facts of the case, that the value of the so-called lithia waters does not reside in their lithium content.

Sarsaparilla.

Various preparations of sarsaparilla, mostly of proprietary nature, are widely used by the public as "blood purifiers." This term is apparently a survival of the old humoralistic pathology which considered all diseases to be due to evil humors in the blood. During the days when this theory was rampant, physicians purged, sweated and bled their patients more thoroughly than wisely in their efforts to eliminate the *materies morbi*. Sarsaparilla has a mild diaphoretic tendency, and might therefore be of some assistance in this eliminative therapeusis. Among the medical profession, however, it never enjoyed any great vogue except in the treatment of syphilis. Today it is used almost exclusively in the form of the compound syrup of sarsaparilla, partly as a means of disguising the tastes of the iodides and partly because of a sort of half belief that it may enhance the antisyphilitic action of mercury.

In regard to the use of compound syrup of sarsaparilla as a vehicle, it may be pointed out that its pleasant flavor is due to the aromatic oils, licorice and sugar which it contains; sarsaparilla itself has a mucilaginous and somewhat bitterish taste, and as far as the flavor of the syrup is concerned is of no advantage. In addition to these ingredients, the compound syrup of sarsaparilla also contains 1.5 per cent. of senna. This quantity of senna is of course too small

to have any laxative effect in the doses of the syrup ordinarily administered, and if a laxative action is desirable it is necessary to reinforce the syrup with some cathartic. If, on the other hand, a laxative effect is not desired, the small quantity of senna can serve no therapeutic use and certainly does not improve the flavor of the mixture. As a vehicle, therefore, the combination is quite irrational.

As an antisyphilitic, sarsaparilla was introduced into Europe in the middle of the sixteenth century, having apparently been copied from the South American aborigines. After a brief popularity it fell into desuetude and was but little used until its revival by William Fordyce in 1757. This author[17] reported thirteen cases of syphilis which he treated with the drug with results satisfactory at least to himself. He asserted that the remedy had fallen into disrepute because of the ignorance concerning the class of cases for which it was suitable and the proper method of preparing the decoction; he states that those who had failed with the drug "all erred in macerating it so long in the water before they boiled it, which spoils it for the next day." The only pharmaceutic preparation which he recognized was made as follows: Three ounces of as fresh a sample of the root as obtainable were added to 3 quarts of water and brought to a boil immediately in an open vessel, the boiling continued until all but 2 pints of the water had evaporated, when it was strained and the liquor given within a period of twenty-four hours, usually divided in two or three doses. Frequently it was used in conjunction with some form of external heat, and under these circumstances produced profuse diaphoresis. Dierbach[18] describes the method of using sarsaparilla in the treatment of syphilis as follows: Half a pound of the root cut up fine is macerated with water till it is in a thick slimy condition, and then pressed through a cloth. Of this fluid the patient drinks early in the morning a glassful and then goes to bed, covers up warmly, and sweats for two hours. If he gets thirsty he must drink nothing else but the sarsaparilla slime.

In twelve out of the thirteen cases reported by Fordyce, mercury had been used either before or during the treatment with sarsaparilla, and as he records a case as cured as soon as the external manifestations of the infection have subsided, it is quite impossible to draw any conclusions as to whether or not his treatment really had

[17] Fordyce, William: Medical Observations and Inquiries, 1757, i, 149.

[18] Dierbach: *Jour. d. pract. Arznik. u. Wundarznk.* (Hufeland's), 1837, lxxxiv, 40.

any effect on the progress of the malady. In the single case in which mercury was not used, the patient was a woman with a syphilitic ulcer of the nose. The author says of the result, "By the use of the decoction for fifty days inwardly and outwardly applied as before mentioned, all the sores healed up, some of the bones threw off exfoliations, others covered up without any sensible exfoliation, she recovered her health perfectly with only the loss of the bones of her nose." He himself seemed to have had subconscious doubts as to the efficacy of the treatment, for in reporting another case he says, "But as I durst not in such a case trust entirely to it (sarsaparilla) I now and then used the mercurial ointment to the quantity of half an ounce of quicksilver in the whole." On such a slender thread of clinical evidence hangs the modern use of sarsaparilla as an antisyphilitic!

The only ingredients in sarsaparilla, aside from the mucilage it contains, which could be suspected of possessing any therapeutic virtues are certain glucosidal bodies related to the saponins. As far as has been determined, the sarsaparilla saponins have no effect on the system which is not common to all of this large group of vegetable principles, and the only therapeutic influence that modern pharmacology assigns to the saponins is due to their local irritant effect on the mucous membrane of the stomach. By virtue of the nausea which they produce, they may increase the secretions of the bronchi and of the skin, and are therefore used in some quarters in the treatment of acute bronchitis.

The case for the use of compound syrup of sarsaparilla as an antisyphilitic may be summed up as follows: There is absolutely no explanation of any possible mode of action of the drug. The clinical evidence of the usefulness of sarsaparilla is both scanty and unreliable. Such testimony of beneficial action as does exist is based on the use of doses of from 2 to 4 ounces of sarsaparilla a day; this would be equivalent to about 5 fluidounces of the syrup three times a day. Therefore, in the dose ordinarily employed, there is not the slightest reason to suspect that the compound syrup of sarsaparilla can have any effect on the syphilitic process. As a vehicle it is an illogical jumble.

Basham's Mixture.

I have no statistics to determine the number of physicians who believe that Basham's mixture is a sort of specific for Bright's dis-

ease. The fact that the popular names of the drug and of the disease begin with the same letter of the alphabet seems, to a certain type of mind, final proof that they were meant to go together.

Some years ago, at the time when it was believed that astringents might be absorbed into the blood, ferric chloride was recommended for the purpose of diminishing the quantity of albumin in cases of parenchymatous nephritis. According to present pharmacologic and pathologic theories, however, this seems neither possible nor desirable.

It is generally held today that the action of astringents is due to coagulation of the bodily proteins. If this view is correct, it is evident that no astringent can exist in the blood, for it would at once precipitate the blood serum, and a fatal thrombosis or embolism would occur. As we are entirely ignorant concerning the mechanism of albuminuria, it is impossible to theorize as to whether, if an astringent could reach the kidney, it would diminish the amount of albumin in the urine. There is not, however, the slightest reason to suppose that to diminish the albumin by any such mechanical means would be of the least benefit to the patient. To hide the rottenness of a beam with a coat of paint does not strengthen the building, nor does the prevention of the excretion of albumin lessen the inflammatory process in the kidney. There are symptoms whose relief is desirable, although we know that in relieving them we do not affect the progress of the disease; but albuminuria can hardly be classed as such a symptom.

I do not wish to be understood as attempting to deny the value of iron in certain cases of nephritis. There is no room for doubt that when Bright's disease is complicated with anemia, as it so often is, the use of this drug is beneficial. This, however, is somewhat beside the question; my main contention is that iron in no form exercises any specific effect on the kidney. It is indisputable that when the renal condition is complicated by anemia, iron, because of its hematinic effect, may be useful; but there is no ground for the superstition that Basham's mixture exercises a special influence. Nevertheless Tyson[19] is forced to remark, "It is prescribed constantly in the most reckless and thoughtless manner."

Dr. Basham, who seems to have originated the mixture of ammonium acetate with ferric chloride which goes by his name, was no believer in the antiquated astringent hypothesis or yet in the specific

[19] Tyson: Practice of Medicine, 1900.

anti-nephritic theory of the effects of iron, for he says in his work on renal disease, published in 1870: "Preparations of iron are the best aid to the blood forming function. But iron in any of these preparations cannot generate blood corpuscles. They can only be formed out of the nutritious elements of the food." In another place, "A long experience of these and other forms of renal disease where the object of the treatment is similar has, however, convinced me that a soluble ammonio-chloride obtained by acidulating liquor amonii acetatis with dilute acetic acid, and then adding the tincture of the perchloride, is the most efficacious of all the so-called preparations of steel." I cannot assent to Dr. Basham's dictum that the solution of iron and ammonium acetate is the most efficacious preparation, for while there is no doubt as to its chalybeate power, its acidity and astringency make it peculiarly liable to disturb the digestive tract.

It verges on sophistry to attempt to justify the use of Basham's mixture in nephritis on the ground of its adding the diuretic effect of the ammonium acetate to the chalybeate action of the iron. If a saline diuretic be deemed desirable, it should be given separately so that the dose of one or the other may be increased according to the requirements of the individual case. It is manifestly bad therapeutics to administer a diuretic if not indicated simply for the sake of obtaining the action of iron on the blood.

While on the subject of iron, I feel impelled to say a word concerning the misapprehension as to the effects of this metal on the system. It is not in any proper sense a "general tonic," whatever that phrase may mean; it has one specific therapeutic action, namely, to increase the hemoglobin content of the blood. Outside of this and the local effects of certain salts, there is no known physiologic action of iron which gives any ground for its therapeutic employment.

Ferric Chloride.

Also I cannot resist saying a word about the use, or rather abuse, of ferric chloride as a hematinic. It would seem as thought large numbers of the medical profession were unaware that there was any other soluble salt of iron known to chemistry, unless they have recourse to the advertised proprietary preparations. The pharmacopeia recognizes a soluble citrate, a soluble phosphate, an iron and ammonium citrate, as well as various compound salts of iron. The chlorid is one of the most highly astringent preparations of iron

which we have, and therefore liable to cause constipation. It is strongly irritant to mucous membranes, and in delicate stomachs will often provoke nausea. The widespread employment of various proprietary forms of iron is due largely to the dread of disturbing the patient's digestive tract with the inorganic salts, a fear which is the outgrowth of unpleasant experiences with the tincture of ferric chloride. I have heard a physician who passes among his fellows as being exceptionally educated speak of this solution as the "strongest" form of iron. What he meant I have been wondering ever since. As a matter of fact, 10 minims of the tincture of ferric chlorid contains less iron than a single Blaud's pill. As an external remedy for checking hemorrhage it is very valuable; as an internal drug it should never be employed.

Opium as a Local Remedy.

There is many a man who, while denying any accusation of being superstitious, nevertheless hesitates to make the thirteenth person at a table, or who has some pet habit which he regards as an omen of good luck. In a very similar way there are many physicians who profess to realize that opium has no local action but nevertheless persist in employing it as a topical remedy. And there may still be some superstitious enough really to believe that a drug so potent as a cerebral depressant must of necessity have powerful local effects. Among the most common evidences of this belief may be mentioned that ancient, if not honorable embrocation known as lead water and laudanum, the addition of opium to nutrient enemas to quiet the rectum, but above all the use of the opium suppository in various pelvic inflammations. The first of these has perhaps a slight theoretical justification, but the other two are as senseless as the incantations with which the ancients preceded their nauseating concoctions.

Crude opium frequently has a marked local irritant effect. The United States Dispensatory says, "When long chewed it excites much irritation in the lips and tongue and may even blister the mouths of those unaccustomed to its use." Dr. Hill in his history of materia medica, published in 1751, remarked of opium that "if kept long on the skin it takes off the hair and it always occasions an itching in it; sometimes it exulcerates and raises little blisters if applied to a tender part," and he recommended its use as a counter-irritant. I have myself seen two cases in which blistering followed

the local application of lead water and laudanum, but whether as a result of this application I cannot say.

Of course a counterirritant would likely be beneficial in various forms of arthritis in which Goulard's extract is commonly employed, and theoretically the counterirritant effect of opium might be beneficial. To this sophistical defense, however, it may be replied in the first place that we have a host of other counterirritants more reliable and safer than opium, and secondly, most of those who use it seem to do so with the idea that the opium will add anodyne or antiphlogistic effect to the astringency of the subacetate of lead. Of the local anesthetic action of opium I shall speak in a minute, but first let me digress briefly to say a few words on the astringent action of the leaden half of this medieval embrocation.

While it is true that lead acetate is an astringent, when applied over the skin its astringent action must be expended altogether on the superficial layers of the epiderm. Moreover, as is well known, when the lead is combined with the opium, it is precipitated as an insoluble meconate. Although some of the older writers attributed mysterious virtues to lead meconate, there is no reason to believe that it possesses any properties not common to the insoluble salts of the heavy metal, such as bismuth subnitrate. The improvement which follows local applications of lead water and laudanum is due in part to the lint and bandages which hold it in place, perhaps slightly to the alcohol, but chiefly to the action of time which passes by while the application is left in place.

When for any reason the ingestion of food must be interdicted for a considerable period of time, and an effort is made partially to maintain nutrition by the use of rectal feeding, the physician is confronted with the difficulty that the rectum soon becomes irritated, and ejects the enema before the nutrient it contains can be absorbed. To prevent this nearly every textbook on medicine recommends the addition of tincture of opium to the enema. This recommendation is based on the belief that opium, by virtue of its local anesthetic effect, will so benumb the mucous membrane of the bowel that it will not feel the presence of the nutrient injection. On what this belief in the local anodyne effect of opium is based I do not know, nor do I believe that its adherents themselves have any definite idea of the origin of the fable. It is true that Wiki[20] found that the injection of the alkaloids of opium beneath the skin lessens the activity of

[20] Wiki: *Arch. interat. d. pharmacod.*, 1911, xxi, 415.

peripheral sensory nerves. In his investigation potassium carbonate proved itself a more powerful local anesthetic; but how many would trust to potassium to calm the peristalsis of the rectum.

It may seem impiously iconoclastic to doubt the hallowed superstitions of the opium suppository. There appears to be in the minds of those who use it a subconscious delusion that as the rectum is nearer to the pelvic organs than the stomach, the opium must act more powerfully on this portion of the body when given by suppository than when given as a pill. As a matter of fact, however, physiologically the rectum is farther away from the pelvis than the stomach. For opium placed in the rectum to reach the bladder, it must be absorbed into the circulating blood and carried up to the heart and back again through the arterial system to the pelvis, and as the distance from the stomach to the heart is less than from the rectum to the heart, it follows that physiologically the stomach is nearer to the bladder. Moreover, were it possible for the morphine of an opium suppository to penetrate the layers of mucous membrane, connective tissue and muscle which separate the interior of the rectum from that of the bladder, it would have no effect on the latter organ, for the anodyne action of morphine, as of the other alkaloids of opium, is purely central. An opium suppository relieves the pain of a pelvic inflammation in the same way that a hypodermic injection of morphine does, by being carried to the brain and benumbing the perceptive centers.

Conclusions.

I have considered in some detail the fallacies of a few common practices not because they are the only, or even the worst, examples of the lack of judicial spirit in therapeutics, but merely to illustrate by concrete illustrations how inadequate is the data to justify the use of some popular drugs. It would only weary the reader and serve no useful purpose to trace the history of such remedies as chimaphila, cypripedium, taraxacum, eupatorium, scutellaria, xanthoxylum, wild cherry, cactus, and a host of other contributions of the Thompsonians and the American Indians to our materia medica. I should like to emphasize, in closing, the explanation of the origin and survival of these practices. Man, despite his education, is still a superstitious animal. Two or three years ago a well known psychologist made a poll of the faculty of Harvard University and found that a majority of these men, representing the highest type

of intellectual development, were willing to confess to a more or less profound belief in some pet superstition as foolish as the old notion of a black cat or a broken mirror as the harbinger of misfortune. If a patient with pneumonia recovers when we sprinkle the bed with sawdust why not sprinkle the beds of all pneumonia patients? When we combine apiol with ergot and the menorrhagia ceases shall we not attribute mystical synergistic powers to the apiol?

Herein lies one reason for the survival of many of these therapeutic superstitions, namely the simultaneous exhibition of inert and potent drugs and then assuming that the diluent has played some part in the effects. The so-called Towns treatment for the morphine habit includes a mixture of hyoscyamus, belladonna and xanthoxylum; but dare anyone with any knowledge of pharmacology attribute any part in the results of this concoction to the fluidextract of prickly ash? A host of these vegetable "simples" owe their reputation to the fact that they are almost universally exhibited with some real remedy.

Another group of drugs owes its vogue to the exploitation by manufacturers of proprietary preparations. When day after day, from glowing blotters on our desk, from pages in our medical journals, in blackest type, glares out boldly the statement that so-and-so's extract of viburnum cures amenorrhea or that somebody else's elixir of euphorbia cures bronchitis, it is a man of more than ordinary intellectual firmness who will not come to believe it. Few men realize how potent is suggestion, or how many of their beliefs are based on the dogmatic assertions of others, rather than on reason.

It is well that all physicians should from time to time analyze the reasons for the therapeutic faith that is within them. Especially searching should be the self-examination of those who are looked up to by their confrères or pupils as authorities, and unflinching should be their determination to recommend no measure of whose utility they cannot give material evidence, either scientific or empiric.

COÖPERATION BETWEEN PHARMACOLOGY AND THERAPEUTICS.[1]

By Albion Walter Hewlett, M.D.

San Francisco.

It is important that a healthy coöperation should exist between those who are engaged in the scientific study of drug action and those who use drugs for the purpose of curing or alleviating disease; for the problems of pharmacology, like those of pathology, have a very immediate bearing on medical practice. Established modes of treatment frequently form the starting point of scientific studies, and the exact knowledge thus gained leads in turn to greater precision in treatment. Pharmacologic studies have uncovered new therapeutic possibilities that have ultimately proved useful in the clinic. Finally, a clear recognition of the fact that substances of similar chemical structure frequently possess pharmacologic properties that are similar but not identical has opened up a vast field of research. Numerous compounds of a given type are now produced with comparative ease by the organic chemist. While many or most of these may possess no great practical advantage over their original prototypes, yet such studies are constantly leading to improvements in our remedies, and the possibility is always present that the systematic combination of chemical and pharmacologic research will tap important fields that have hardly been suspected hitherto.

Now more than ever before, therapeutic advance depends on an intelligent utilization of the methods, the criticisms and the new discoveries of pharmacology. Older remedies are being restudied, and from the host of newer ones that are constantly being placed before the profession an intelligent choice must be made. Before I undertake to discuss how coöperation between the pharmacologist and therapeutist may be promoted, however, it may be well to point out some of the factors which tend to separate these two classes of workers. In the first place, their attitudes toward their respective problems are essentially different. The pharmacologist contem-

[1] Chairman's address, read before the Section on Pharmacology and Therapeutics at the Sixty-eighth Annual Session of the American Medical Association, New York, June, 1917. Reprinted from the *Journal of the American Medical Association*, October 6, 1917.

plates with scientific skepticism that which is unproved, and he proceeds slowly and carefully from the known to the unknown. The therapeutist, on the other hand, brought face to face with a crisis in the life of his patient, cannot refuse to try the unproved when remedies of known efficacy are lacking. Hence he often grasps at straws, being restrained only by the possibility of doing harm to his patient. Such a practice, justifiable in itself, too often leads to those habits of inaccurate reasoning that are reflected in therapeutic literature. Optimism in practice often means an unjustified and uncritical enthusiasm in the interpretation of results.

The pharmacologist and the therapeutist are further separated by the conditions under which their observations are commonly made. In the laboratory the action of drugs is usually studied on normal animals, and toxic doses can be administered with impunity. In the clinic, on the other hand, therapeutic doses alone are used, and the effects of these are often modified by disease. The pharmacologist is permitted to employ methods of study which involve operative or other harmful procedures. The clinician is restricted to those methods of study that can be used without harm to his patient. Finally, the laboratory worker plans a series of experiments, and he endeavors to eliminate errors by repetition and by controlling the various factors that might influence his results. In therapeutics the number of observations is necessarily limited by the available clinical material, and the interpretation of results is often hampered by the fact that the effects of other factors, such as the natural course of the disease and the action of the other drugs used, is difficult to estimate and is, indeed, often estimated incorrectly. Under such conditions, years may elapse before even a simple therapeutic problem is conclusively answered.

As I have said, pharmacologic studies are usually made on normal animals. In seeking to utilize the knowledge thus obtained for therapeutic purposes, the following questions arise: (1) Are the effects observed produced by doses that can safely and easily be administered to patients? (2) Will the human organism react in the same manner as the animal studied? (3) How is this reaction modified by disease?

The question of dosage, simple as it may seem, has caused and will probably continue to cause occasional therapeutic stumbles. The fact that large doses of strychnine were known to produce a marked rise of arterial pressure in animal experiments was in part respon-

sible for its extensive use by clinicians in conditions of low pressure. Yet it now seems established that in safe doses strychnine does not raise the blood pressure materially, either in man or in animals. The rise of pressure, therefore, is a toxic effect; and, so far as we know, it is not available for therapeutic purposes. Due consideration must also be given to the fact that in the laboratory intravenous injections are frequently used, whereas in medical practice these are seldom given except in emergencies. Finally, different species of animals may vary in their reactions to a given drug. When the reaction is essentially the same in a variety of mammals, it may be assumed that the human organism will respond in a similar manner; but when the reaction varies, the effect on man cannot safely be predicted from laboratory studies. In practice, moreover, even lesser quantitative variations in response may become of paramount importance, for it is our purpose to secure therapeutic results, and at the same time to avoid unpleasant side effects.

One of the most important methods for helping to bridge over the gap between animal pharmacology and practical therapeutics is the accurate study of the effects produced when drugs are given in the usual medicinal doses to human beings. The methods employed in making such studies must naturally be free from the possibility of doing harm. Fortunately a great variety of new methods have been developed in recent years which may be applied to the study of human functions. Without attempting to name all of these, I mention the following: bloodless determinations of the arterial and venous pressures; graphic records of the gastric contractions, of the arterial and venous pulse waves and of the electric changes accompanying cardiac activity; roentgenographic examinations of the alimentary tract; determinations of the rate of metabolism; chemical analyses of the alveolar air, of small quantities of blood and of excreta, and estimations of the various immune bodies in the blood. Each new method that can be applied to the study of human functions not only advances our knowledge of these functions and of their perversions in disease, but also makes possible more accurate studies on how these functions are influenced by various remedial measures. In many cases such studies can be carried out on normal individuals, and within a short space of time sufficient data can be accumulated to establish with scientific accuracy certain aspects of drug action.

Ultimately, however, we must answer the question: Are these

drug effects of value in combating the disturbances of functions that are encountered in disease? The final answer to this question can seldom if ever be given from studies either on normal animals or on normal men. In certain instances the diseased function is unusually susceptible to drug action. The body temperature of a febrile patient, for example, is reduced more easily by antipyretic drugs than is the body temperature of a normal person. Digitalis in therapeutic doses has relatively little effect on the heart rate when this is controlled in the usual way from the sinus region. Its reputation for slowing the heart of patients is based almost exclusively on observations which were made on those suffering from auricular fibrillation. Diuretics of the caffein group produce a moderate diuresis in the healthy man, and may be ineffective or harmful in nephritic edema, whereas in cardiac edema they often cause a veritable flood of urine. The dilatation of the bronchi produced by epinephrin is most plainly demonstrable in conditions of bronchial constriction, whether produced experimentally or occurring during asthma. Finally, the treatment of infections can manifestly be tested only on infected animals or human beings.

Not infrequently the remark is made that the value of a therapeutic measure is determined solely by clinical experience. While I have no desire to contradict this assertion, it should be pointed out that ordinary clinical observations are often extremely difficult to interpret, owing to the vagaries of disease and to the many remedies that are so commonly employed in a single case. The past history of therapeutics warns us that in order to avoid error we need as much assistance as possible from every source. Pharmacology may not, indeed, answer therapeutic problems directly, but at least it aids in their solution. It shows how drug action may be made the subject of accurate study, and the critical attitude which it adopts must be carried over into the interpretation of therapeutic results, if progress in that subject is to be placed on a firm foundation.

On the other hand, pharmacologists could, I believe, be of greater help to those who work in the clinic if they would fully realize how their results may be given a form more suited to clinical needs. What, for example, is the effect of a given drug in small doses, especially when given over a long period of time? How are the effects modified when animals have been made the subject of disease? What pharmacologic problems can be studied on man himself, and especially on patients who are taking the treatment usually

given for their disease? Work on such lines as these, whether by pharmacologists or by clinicians, will help to maintain contact between the science of drug action and the art of treatment.

NOTES ON THE THIRD ANNUAL EXPOSITION OF CHEMICAL INDUSTRIES, HELD IN NEW YORK SEPTEMBER 24–29, 1917.

By Samuel P. Sadtler, Ph.D.

The idea of a special exposition to show the condition and possibilities of distinctively American chemical industries was first taken up in 1915, shortly after the general realization had come that because of the world-war we were cut off from European supplies and that we must take hold where necessary and provide chemicals for ourselves. It is not necessary now to review the conditions that existed in the beginning of the year 1915. Suffice it to say that not only the users of dyes and synthetic medical preparations and the manufacturers of fertilizers had already realized that their supplies were cut off for an indefinite period but, on patriotic grounds, manufacturers had determined to make an immediate effort to build up a distinctively American chemical industry on broad foundations.

How they have succeeded in this praiseworthy effort, these three successive Exhibitions of 1915, 1916 and 1917 have shown. Not only has the number of exhibitors and space taken increased year by year until three floors of the Grand Central Palace building were filled this September, but the comprehensiveness and quality of the exhibits increased in a notable degree. In this connection, it was stated by Dr. Herty, the chairman of the advisory exhibition committee, that "up to September, 1917, the new capital invested in the varied branches of chemical endeavor in the United States increased the total investment at the opening of the war by nearly $231,000,000," and it was also stated that the total output of 46 American manufacturers of coal-tar dyes now approximates 60,000,000 pounds a year and that more than $12,000,000 worth was exported during the fiscal year ending June 30, 1917.

We shall briefly note a few items of interest that a visit of several days to the recent exposition brought to our attention. The won-

derfully rapid development of an American dye-color industry is perhaps the most striking feature illustrated by these successive expositions. Within the past year several of the most important of the American dye-color works have been united under the name of "The National Aniline & Chemical Co., Inc." This combination includes the Schoellkopf Aniline & Chemical Works of Buffalo, N. Y., the W. Beckers Aniline & Chemical Works of Brooklyn, N. Y., The National Aniline & Chemical Co. of New York, the Benzol Products Co. of Marcus Hook, Pa., and the Standard Aniline Products, Inc., of Wappingers Falls, N. Y., together with certain plants and properties of the General Chemical Co., the Barrett Co. and the Semet-Solvay Co. With these has also been incorporated most recently the Cassella Color Co. (American branch) who have, under the name of the Century Color Corporation, taken over the selling agency of the whole combination. The exhibit was a collective one as far as the dye-colors are concerned, and was a most impressive one. Almost the whole range of standard coal-tar dyes was represented, as well as a long list of so-called "intermediates" and many organic chemicals and drugs available for the pharmaceutical profession and the synthetic perfume industry.

There were quite a number of other manufacturers and dealers in intermediates and raw materials of the dye-color, the perfume and the pharmaceutical industries.

The way in which American chemists and manufacturers have responded to the needs of war-time is also shown in the way in which chemical glassware and porcelain ware of superior quality, equal to the best Jena glass or the best Berlin porcelain, are now offered. Whitall-Tatum Glass Co. and the Macbeth-Evans Glass Co. were among the most prominent of the glass supply firms, while the Ohio Pottery Co. and the Coors Chemical Porcelain Co. of Colorado supplied the porcelain. For the general equipment of the chemical manufacturer with specially designed apparatus, can be mentioned the Buffalo Foundry and Machine Co., which had the largest and most striking single exhibit, showing fusion kettles, nitrators, vacuum dryers, evaporators, etc.; the J. P. Devine Co., the Bethlehem Foundry & Machine Co., the Walter E. Lummus Co., the Swenson Evaporator Co., and the United Lead Co. For special lines of apparatus, instructive exhibits were also shown as the pyrometers of the Brown Instrument Co. and the Bristol Co., and the centrifugal separators of the De Laval Separator Co. and the Sharp-

less Specialty Co., both of which concerns have now adapted the centrifugal separating principle to the clarifying and filtering of oils with marked success.

Filter presses and filtering media (of silica, etc.) were also shown in very great variety by the United Filters Corporation, the General Filtration Co., Inc., the Industrial Filtration Corporation, the Celite Co. and others. Fused silica or quartzware for the laboratory and factory were shown in great variety by the Hanovia Chemical & Manufacturing Co. and the Sidio Co. of America.

One of the most interesting exhibits and one which points out the way for great industrial results was that of the Research Corporation, which has the applications of the Cottrell electrical precipitation in hand. This process has already been applied very extensively by the great smelter plants to collect and recover values from their fumes. The most recent application is by cement works and iron blast furnaces for the recovery of the potash salts heretofore lost with their waste gases.

The United States Smelting Co. had an interesting exhibit from their Perth Amboy plant, and showed among other things gold, platinum, palladium, selenium and tellurium recovered from the anode slimes of the electrolytic copper production. Both the vitreous, the amorphous and the crystalline varieties of selenium were shown, the first named in large blocks of a beautiful luster. Tellurium was shown in large masses of a crystalline structure resembling antimony.

The Foote Mineral Co., Inc., of Philadelphia, had a very interesting and striking exhibit of rare minerals and the products extracted therefrom. Many of these have been hitherto considered as of great rarity and are now for the first time shown in quantity.

The Takamine Laboratory, Inc., showed a new product of great interest to the textile trade. It is called "Polyzime" and is a new, powerful, enzymic product of Japanese origin. It is said to be strongly diastatic, as it solubilizes, dextrinizes and saccharifies starches; it is proteoclastic, as it digests or reduces various protein matters such as gluten, sericin in silk, pectin, milk, etc. It is specially prepared for de-gumming and de-sizing purposes in the textile trade.

Very instructive exhibits of a specially pharmaceutical character were also shown by Merck & Co., E. R. Squibb & Sons, and the Monsanto Chemical Co.

Much more of interest was shown, but the underlying element of value was the demonstration of the rapid strides that the American chemical industry is now making.

CURRENT LITERATURE.

Scientific and Technical Abstracts.

A New Process for Carrel-Dakin Solution.—Dr. Alexis Carrel, in conjunction with Dr. H. D. Dakin, has evolved a comparatively new and revolutionary method for treating infected wounds, using a definite hypochlorite solution. The method for the preparation of this so-called Dakin Solution was worked out by G. Ornstein for the Electro-Bleaching Gas Co. The method consists in enclosing liquid chlorine in quantities of exactly 5 Gm. in glass tubes, sealed at one end, of 8 to 9 Mm. outside diameter and 8 to 9 in. long and then sealing the other end of the tube by drawing it out to a point. All of these tubes before they are allowed to go out of the laboratory are tested under increased pressure by heating them to a temperature of 75° C., which raises the pressure of the liquid chlorine from a pressure at ordinary temperatures of 80 to 90 lbs. to over 350 lbs. per sq. in. The glass tubes will stand this immense pressure although their walls are only ½ to ¾ Mm. thick. The method of breaking the ampoule with liquid chlorine in the alkali solution has been recently improved by a simple device. The glass bottle in which the solution is prepared is now closed by a rubber stopper, to the bottom of which is fastened a short piece of rubber tubing by means of a short piece of glass rod. The ampoule is fastened with its butt in the open end of the rubber tubing so that the pointed end points downward, and the ampoule is suspended pendulum-like in the bottle containing the alkali solution. The Electro-Bleaching Gas Co. has recently completed arrangements with the pharmaceutical firm of Johnson & Johnson, New Brunswick, N. J., for the marketing of this new development in the liquid chlorine field. —(From *The Journal of Industrial and Engineering Chemistry.*)

Aconite Root Substitute.—Examination of samples of aconite obtained in import and interstate trade has disclosed that aconites not recognized in the United States Pharmacopœia, especially "Japanese

aconite" (*Aconitum fisheri* Reich.), have been substituted in some instances for the official aconite (*Aconitum napellus* L.). This substitute is not official in the United States Pharmacopœia and, as far as this bureau is informed, is not official in the pharmacopœia of any other country. These substitutes do not contain aconitine, but other alkaloids, Aconites obtained from species other than *Aconitum napellus* should be labeled so as to indicate the geographical source, and, preferably, also the botanical source, with the additional statement, "Not recognized in the U. S. P.," and should not be used in any of the pharmaceutical preparations of aconite official in the Pharmacopœia.

It may be pointed out that Japanese aconite usually consists of mother (with stem bases) and daughter tubers (with buds), which may be distinguished from those of the official aconite, *Aconitum napellus,* by their much smaller size and weight, less wrinkled and not twisted appearance, more or less short conical shape, generally more mealy condition due to starch, and microscopically by the different arrangement of the fibro-vascular bundles, which is usually not so markedly star shaped. (*Service and Regulatory Announcements, U. S. Dept. of Agriculture.*)

Arnica Flowers Substitute.—Examination of samples imported as "arnica flowers" has disclosed that *Inula britannica* L. has been substituted in some instances for *Arnica montana* L. This substitute is not official in the United States Pharmacopœia and, so far as the bureau is informed, is not official in the pharmacopœia of any other country. Since *Arnica montana* contains active principles which are not found in *Inula britannica* L., the latter is not a proper substitute for *Arnica montana.* The department will recommend the exclusion from the United States of importations of any products offered for entry as "arnica flowers," but found to consist wholly or in part of flowers of *Inula britannica* L.

The striking differences between the authentic product and the adulterant are that in the adulterant the length of the young achene (undeveloped fruit) is very much shorter, about 1 millimeter long, while it is from 5 to 7 millimeters in the genuine product. The ligulate (ray) flowers are also considerably smaller in length and width than those of the true arnica flowers. The veins number four in the ligulate (ray) flowers of *Inula britannica* L., while 10 have been observed in those of arnica and 7 to 12 are reported in the literature.

The receptacle (the enlarged end of the flowering stalk) is smooth in the flowers of *Inula britannica* L., but hairy in true arnica flowers. There is an abundance of hairlike structures of certain flower parts developed in both species, which are the cause of a somewhat similar appearance of the products. (*Service and Regulatory Announcements, U. S. Dept. of Agriculture.*)

BELLADONNA LEAVES SUBSTITUTE.—Examination of samples of importations of "belladonna leaves" has disclosed that *Solanum nigrum* L. has been substituted in some instances for the true material. Since this species contains alkaloids other than those present in the genuine belladonna (*Atropa belladonna* L.), official in the United States Pharmacopœia, the department will recommend the exclusion from the United States of any shipment labeled "Belladonna leaves" but consisting wholly or in part of *Solanum nigrum.* (*Service and Regulatory Announcements, U. S. Dept. of Agriculture.*)

BUCHU LEAVES SUBSTITUTE.—Attention is called to the fact that samples labeled as "long," "short," and "oval" buchu leaves and offered in the trade have been found to be obtained from species not official in the United States Pharmacopœia. The "long buchu" proved to be *Empleurum serratulatum* Sol. et Ait., the "short buchu" was identified as *Barosma pulchellum* Bartling and Wendland, and the "oval buchu" was identified as *Barosma crenulata* Hook, var. *latifolia.* The sizes of the leaves are distinctly different from those of the two official species, *Barosma betulina* (Thunberg) Bartling and Wendland, and *Barosma serratifolia* (Curtis) Willdenow, given in the Pharmacopœia. The flavor also of the three adulterants, especially that of *Empleurum serratulatum* and *Barosma pulchellum,* is markedly different from that of the official species.

Material obtained from the above-mentioned unofficial species should not be used in official preparations, and the department will recommend the exclusion from the United States of shipments of any such material unless properly labeled. (*Service and Regulatory Announcements, U. S. Dept. of Agriculture.*)

DANDELION ROOT OF INFERIOR QUALITY.—Examination of samples from a recent importation of dandelion root, *Taraxacum officinale* Weber, disclosed the presence of about 40 per cent. of

roots which were badly discolored inside and did not show a porous, pale yellow wood, as required by the United States Pharmacopœia, IX, 1916. The appearance suggested that the material had been improperly dried. This fact was confirmed by microscopic examination showing swollen brownish-yellow masses, indicating that the inulin masses had been partially hydrolyzed and caramelized. The department will recommend the exclusion from the United States of any importation of dandelion root which upon examination is found to contain more than 15 per cent. of dead roots and roots that are more than slightly discolored as a result of improper drying. (*Service and Regulatory Announcements, U. S. Dept. of Agriculture.*)

HOREHOUND SUBSTITUTE.—Examination of samples of importations of so-called "horehound" has disclosed that the material in some instances consisted of *Ballota hirsuta* Benth, instead of *Marrubium vulgare* L. Material obtained from *Ballota hirsuta* should not be labeled or sold as and for horehound nor used as a substitute therefore. (*Service and Regulatory Announcements, U. S. Dept. of Agriculture.*)

MUSTARD SEED STANDARD AND ASSAY METHOD.—Mustard seed is the ripe seed of *Sinapis alba* L. (white mustard), *Brassica nigra* (L.) Koch (black mustard), *Brassica juncea* Hook. f. et Th. or the varieties or closely related species of the types of *Brassica nigra* and *Brassica juncea* Hook. f. et Th., e. g., *Brassica cernua* Thunb., containing not more than 5 per cent. of other seeds or other foreign matter and yields not more than 5 per cent. of total ash nor more than 1.5 per cent. of ash insoluble in hydrochloric acid. Mustard seed, except that obtained from *Sinapis alba* L., yields a volatile oil similar in character and composition to the volatile oils yielded by the above-mentioned species, and when assayed by the method outlined below the yield of volatile oil is not less than 0.6 per cent., calculated as allylisothiocyanate:

METHOD FOR THE DETERMINATION OF VOLATILE OIL IN MUSTARD SEED.

Place 5 grams of the ground seed (No. 20 powder) in a 200-mil flask, add 100 mils of water, stopper tightly, and macerate for two hours at about 37° C. Then add 20 mils of U. S. P. alcohol (95 per cent.), and distill about 60 mils into a 100-mil volumetric flask containing 10 mils of 10 per cent. ammonium hydroxid solution, taking care that the tip of the condenser dips below the

surface of the ammonium hydroxid solution. Add 20 mils of 0.1 N silver nitrate solution to the distillate, set aside over night, heat to boiling on a water bath (in order to agglomerate the silver sulphid), cool, make up to 100 mils with water, and filter. Acidify 50 mils of the filtrate with about 5 mils of concentrated nitric acid and titrate with 0.1 N ammonium thiocyanate, using 5 mils of 10 per cent. ferric ammonium sulphate solution for an indicator. Each mil of 0.1 N silver nitrate consumed equals 0.004956 grain of allylisothiocyanate. (*Service and Regulatory Announcements, U. S. Dept. of Agriculture.*)

STRAMONIUM LEAVES SUBSTITUTE.—Examination of samples of importations of "stramonium leaves" has disclosed that *Xanthium strumarium* L. has been substituted in some instances for the true material. The examination further showed the absence of the alkaloids characteristic of the drug of the genuine stramonium leaves, *Datura stramonium* L., official in the United States Pharmacopœia. The department will recommend the exclusion from the United States of any shipment labeled "stramonium leaves" but consisting wholly or in part of *Xanthium strumarium.* (*Service and Regulatory Announcements, U. S. Dept. of Agriculture.*)

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE SEMI-ANNUAL MEETING.

The semi-annual meeting of the Philadelphia College of Pharmacy was held September 24, 1917, at 4 P. M. The President, Howard B. French, presiding. The minutes of the quarterly meeting held June 25 were read and approved. The minutes of the Board of Trustees for June were read by the Registrar, J. S. Beetem, and approved.

The report of the Committee on Nominations was read and ordered entered and filed. Mr. George M. Beringer for the delegates to the Conference of Pharmaceutical Faculties held at Indianapolis, August, 1917, reported verbally. President Lyman's address was of great interest; higher standards for pharmacy were largely dwelt upon. Four years' high-school course was made a requirement for college entrance from 1923. The Conference suggested that teachers in colleges of pharmacy should be required to carry on a certain amount of research work and to prepare one or two papers each

year on subjects of interest to pharmacy. It was also urged that endowments were necessary for the future prosperity of colleges of pharmacy.

Mr. Beringer also reported verbally (in the absence of other members of the delegation) for the meeting of the American Pharmaceutical Association. An extended report of this meeting is published in the AMERICAN JOURNAL OF PHARMACY for October, 1917, pages 472–484.

Professor Samuel P. Sadtler, for the Committee on Publication, reported verbally that, owing to the resignation of Professor Henry Kraemer, it was necessary to provide for the position of Editor, and that George M. Beringer had been appointed Editor, pro tem.

Election of Trustees: Messrs. J. M. Baer, H. W. Youngken and Mitchell Bernstein were appointed tellers. Previous to the ballot being taken Mr. C. Stanley French, of the Committee on Nominations, read letters from C. Mahlon Kline and Walter V. Smith requesting that their names be withdrawn as candidates for Trustees. While the tellers were counting the ballot Mr. French stated that during the summer a large quantity of material had been received from the Medico-Chirurgical College that will be of great value to our College. Also during the summer some changes had been made in the building; large new blackboards, new cases, new bulletin boards and other additions had been made.

As a result of the ballot the tellers reported the election of George M. Beringer, Joseph W. England and Josiah C. Peacock to membership in the Board of Trustees for the ensuing three years.

The President appointed the Committee on Membership as follows: Freeman P. Stroup, Chairman, Otto W. Osterlund, Richard H. Lackey, with the Treasurer and Secretary, ex officio.

C. A. WEIDEMANN, M.D.,
Recording Secretary.

ABSTRACTS FROM THE MINUTES OF THE MEETING, BOARD OF TRUSTEES.
June 5, 1917.

Professor Freeman P. Stroup was elected Professor of General Chemistry, and Professor J. W. Sturmer was elected Professor of Pharmaceutical Chemistry.

Bachelor of Pharmacy (Phar.B.) was the title of the degree agreed upon for the new third-year course. It was also agreed that no store experience be required for this degree.

Committee on Examinations recommended that the degree of B.Sc. (in Pharmacy) be given to Louis Gershenfeld, P.D., at the next commencement. It was so ordered.

Committee on Commencement recommended that the usual vote of thanks be extended to those who had rendered services in connection with Commencement week exercises. It was so ordered.

Special Committee on Resolutions. Mr. French read a copy of a letter sent to President Wilson in relation to pharmacy students being drafted for military service, and also the reply of General Crowder, defining the present status of pharmacists in the Army and Navy.

On motion of Mr. Rumsey, the Treasurer was authorized to pay salaries and bills during the recess of the Board.

CORRESPONDENCE.

National Associaton Boards of Pharmacy.

Chicago, Illinois, October 4, 1917.

Editor American Journal of Pharmacy,
Philadelphia, Pa.

Dear Sir: It might be of interest to many of your readers to know that the great state of Pennsylvania is now a full fledged *active* member state of the National Association of Boards of Pharmacy, with reciprocity for pharmacists of that state with 39 other states. In order to be eligible for reciprocal registration in other states, registration must have been on the basis of examination before the Pennsylvania Board of Pharmacy with certain grades, etc. (Registration on college diploma does not entitle the holder to *reciprocity*.)

Forty states now hold *active* membership in the National Association of Boards of Pharmacy, between which reciprocity for full registered pharmacists (licentiates) is in force, provided that registration of applicants for reciprocity must have been by examination before the State Board of Pharmacy in the *active* member state from which they come. Certificates of registration obtained under state laws *without examination*, or on the basis of college of pharmacy diploma *without examination* before boards of pharmacy, do *not* entitle holders to reciprocity.

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List of *active* member states follows: Alabama, Arizona, Arkansas, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, West Virginia, Wisconsin.

Full information may be had by addressing this office.

Very truly yours,

H. C. CHRISTENSEN,
Secy. N. A. B. P.

BOOK REVIEWS.

HAND BOOK OF PHARMACOGNOSY, by Otto H. Wall, M.D., Ph.G. Fourth Edition. St. Louis: C. V. Mosby Company, 1917. 629 pages.

According to the author, the object of this book is mainly to serve as notes on pharmacognosy for students in colleges of pharmacy, for students preparing for State Board of Pharmacy examinations and for everyday exigencies of the retail pharmacist.

The following subjects are treated: Fundamental Studies; Special Studies; Classifications; Method of Study and Animal and Vegetable Drugs, which are treated in 86 groups.

The author discussed the relative merits of the alphabetical, botanical, therapeutic, physiologic and therapeutic combined, organoleptic and physical classifications of drugs, and places most confidence in the classification based upon physical characteristics. In fact, this is the classification adopted for the treatment of drugs which follows.

There are many points in favor of this viewpoint although the writer has found the use of a system based partly upon natural relationship as far as possible and partly upon physical characteristics of drugs to be productive of more interest on the part of the student.

In this treatment of the various vegetable and animal drugs the author fails to consider drugs in a powdered or granulated condition. This point of view would undoubtedly be correct were all

commerce in drugs restricted to those medicaments in an entire or nearly entire form. However, he fails to take into account that by far the greater number of drugs handled by the average pharmacist are in the powdered or granular form.

The statement is made that the study of powdered drugs is not, strictly speaking, part of pharmacognosy. To this the writer desires to take issue. Can it be possible that a powdered drug is not a commercial form of drug? Is not the consideration of commercial forms of drugs one of the most important phases of pharmacognosy?

The figures of whole crude drugs for the most part are excellent, and will prove very helpful in aiding the student identify the drugs in this condition. The same cannot be said for the illustrations of sections. In few instances have the parts of these been indicated in the figures, and in most cases no mention of histological details characteristic of the sections has been made in the text accompanying them. The experience of many has shown that figures mean very little if not accompanied by proper explanations.

Under the caption, "Fresh Fleshy Fruits," the raspberry is cited as an aggregate or multiple fruit. Since this fruit is the product of the ripening of the many carpels of one flower on their receptacle, it must be solely an aggregate fruit, for a multiple fruit is the product of the ripening of a flower cluster (inflorescence).

Under another caption, vanilla is treated as a pod, while, as a matter of fact, the vanilla fruit is a one-celled capsule formed by the union of three carpellary leaves. Again under the headings *Rhamnus Purshiana* and *Frangula* respectively, the statement is made that each of these barks must be kept for at least one year after collecting, because the fresh bark is too acrid and produces griping. It has been satisfactorily demonstrated, however, that the griping principles of both of these drugs can be destroyed by heating the barks at 100° C. for forty-eight hours.

Moreover, in the consideration of the various kinds of starches no mention is made concerning the range in size of the starch grains. Since the forms of starch grains in many species of plants belonging to the same family are closely similar, it would seem imperative to know the range in size in terms of mikrons for the starch grains discussed in order to aid in distinguishing them from those of other closely allied species.

Finally, it is disappointing to find so little space devoted to the consideration of adulterants of drugs, especially since reports from

the drug trade and state and federal laboratories seem to show an increase in this sort of manipulation from the time that foreign drugs became scarce.

HEBER W. YOUNGKEN.

A CRITICAL REVISION OF THE GENUS EUCALYPTUS, by J. H. Maiden, I.S.O., F.R.S., F.L.S., Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney. Published by authority of the Government of the State of New South Wales. William Applegate Gullick, Government Printer, Sydney. Price 2s. 6d. per part.

Vol. III, Parts 9 and 10, and Vol. IV, Part 1, of this voluminous monograph of the genus *Eucalyptus* have now come to hand. The author continues to treat in a most lucid exposition the numerous species of this genus that are indigenous to Australia.

Part 9 presents descriptions, distinctive botanical characters and affinities, territorial range, economic uses, etc., of the following species: *E. Baeuerleni* F.v.M.; *E. scoparia* Maiden; *E. Benthami* Maiden and Cambage; *E. propinqua* Deane and Maiden; *E. punctata* DC.; *E. Kirtoniana* F.v.M.

Part 10 in the same way covers the following: *E. resinifera* Sm.; *E. pellita* F. v. M.; *E. brachyandra* F. v. M.

Part I of Vol. IV similarly describes *E. tereticornis* Smith; *E. Bancrofti* Maiden, *E. amplifolia* Naudin.

The lithographic illustrations are quite artistic and add materially to the descriptions and are hence of great service to the student of this interesting group of plants and the economic products obtained from these.

Mr. Maiden's work on this genus is a further elaboration and continuation of the Eucalyptographia of his predecessor Baron Ferd. v. Mueller, and is destined to be a masterpiece of monographing.

G. M. B.

LATIN FOR PHARMACISTS, by Geo. Howe, Ph.D., Professor of Latin, University of North Carolina, and John Grover Beard, Ph.G., Associate Professor of Pharmacy, University of North Carolina. First edition; octavo, cloth, 134 pages, price $1.00. Published by P. Blakiston's Son & Co., 1012 Walnut Street, Philadelphia, Pa., 1917.

This book is divided into two parts, the first consisting of nineteen lessons, presenting in progressive arrangement the necessary

instruction in forms and syntax, and according to the authors, excluding everything which, however desirable and helpful, is not of immediate practical use to the pharmacist. At the end of each lesson, there is a double set of exercises, requiring translations into English and into Latin. Several lessons are devoted to the practice of writing and reading prescriptions.

It is pleasing to note the adoption of the English pronunciation in this little volume, as it is the custom of scientists generally to apply the English pronunciation to such Latin terms as are used in scientific nomenclature. Moreover, advanced medical educators have adopted the English pronunciation, and it facilitates matters greatly to have uniformity in Latin pronunciations, as far as the druggist and physician are concerned.

Undoubtedly, the book is intended only as a guide for the minimum Latin course prescribed in the Pharmaceutical Syllabus, and is to be supplemented by classroom work under the direction of the teacher. The authors have succeeded in stripping the subject of everything but absolute essentials in their book, and it should therefore be well received by students and teachers who have only a minimum amount of time to devote to this subject of the pharmaceutical curriculum.

ROBERT P. FISCHELIS.

OBITUARY NOTICES.

The death is announced of Prof. Eduard Buchner, Ph.D., professor of chemistry at Wurzburg, who died from wounds received while serving as major in the German Army near Verdun. Dr. Buchner was distinguished for his work on the chemistry of fermentation, and was the recipient of the Nobel prize for chemistry in 1907.

Prof. Adolf Ritter von Baeyer, professor of chemistry at the University of Munich, honorary member of the A.C.S., and one of Germany's best known organic chemists, died in Germany the latter part of August, at the age of 82. He was distinguished for his work on coal-tar derivatives and dyes, especially that on synthetic indigo and eosin. He was elected as professor at the University of Berlin in 1868, at Strassburg in 1872, going to Munich in 1875. In 1905 he was awarded the Nobel prize for chemistry.

George M. Olcott, a member of the well-known firm Dodge & Olcott, New York, manufacturers and importers of essential oils and perfume products, died on September 14, 1917. Mr. Olcott was prominent in commercial and financial circles for many years.

Professor Charles Caspari, Jr., of Baltimore, Md., died suddenly on Saturday morning, October 13. In addition to being a teacher in the Baltimore College of Pharmacy, Prof. Caspari was, for a long time, the General Secretary of the American Pharmaceutical Association and many of its Annual Proceedings were edited by him.

For some years he has served the State of Maryland as Food and Drug Commissioner. He was preparing to visit his office in the Health Department when the summons of death came. While his friends knew that for some time his health was in a rather precarious condition and that he was a sufferer from a cardiac ailment, his sudden decease was nevertheless a severe shock.

On Tuesday, October 23, a memorial meeting was held in the Chemical Hall of the University of Maryland, and many of his friends gathered to attest their regard and to pay a fitting tribute to one whose life had been mainly spent in the interest of pharmacy.

An appropriate memoir of this eminent American pharmacist will be published in the AMERICAN JOURNAL OF PHARMACY at an early date.